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QRP Quarterly

Volume 49 Number 3
Summer 2008
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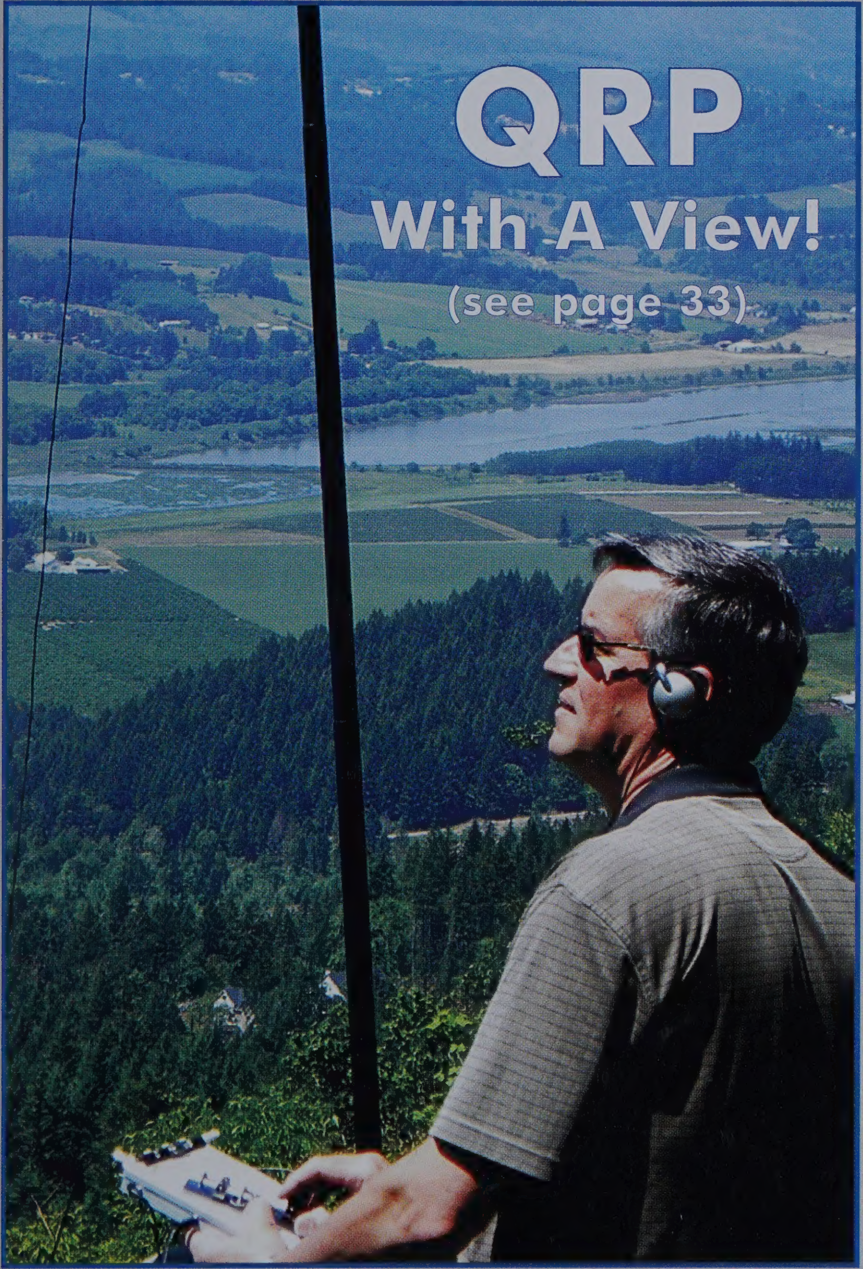
Journal of the QRP Amateur Radio Club International



QRP
With A View!
(see page 33)

- FDIM Report and Photos, plus the Homebrew Competition Story
- *Life is Too Short for QRO:* QRP Ideas (and Philosophy) from G3RJV
- K3WWP's Amazing QRP CW QSO Streak
- K0ETD Builds a "Hollow-State" Transmitter
- Contest Results—
  Spring QSO Party Results
  Grid Square Sprint Results
  Contest Announcements—it's a Busy Fall and Winter Season!

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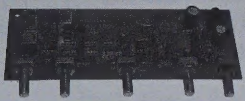

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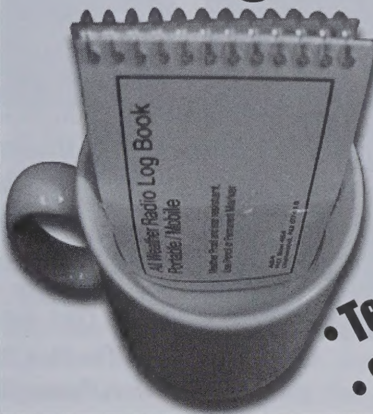

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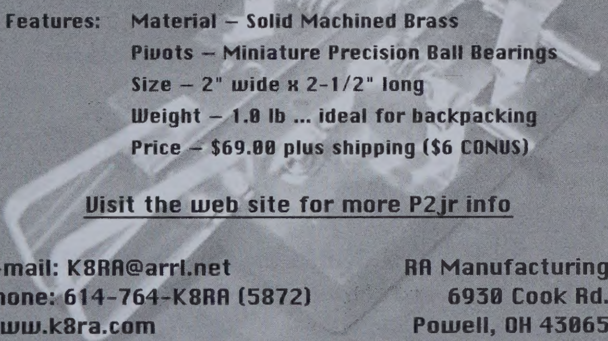

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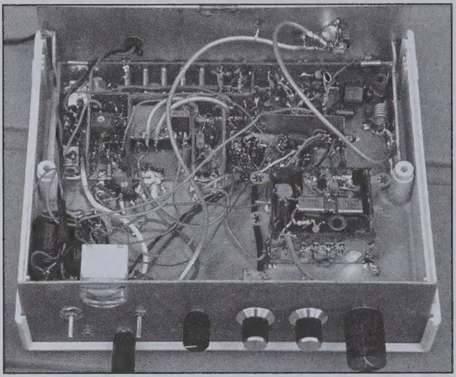

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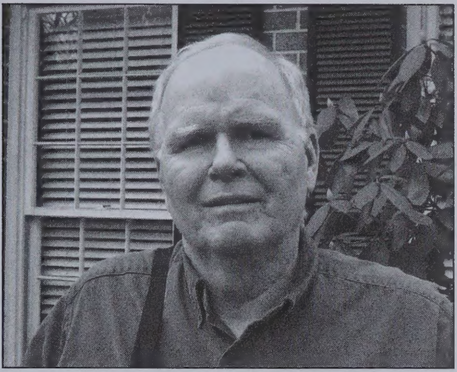


At the 2008 Four Days in May conference in Dayton, I had the privilege of sitting in on the open session between the QRP ARCI Board of Directors and interested attendees, which is held for the purpose of obtaining feedback and improving our service to the membership. One of the primary points of interest expressed by the Board is how we can reach out and connect to local clubs. What surprised me was that some members said that in their own local ham radio club, they are one of few QRPers, if not the only one. Not surprisingly, it is common for there to be enthusiasm for QRP-related events and topics of local discussion when the club itself is QRP-oriented. Apparently, not so when the club is composed of members whose primary interest is DX, contesting, homebrewing, vintage equipment or regional nets. However, from the QRPer's standpoint, all of those activities may overlap with interest in low power operation; i.e, the challenge of doing more with less.

The question becomes, then, how do you as the QRP member attain stature within the club based on your special interest, and not have it be seen as an oddity by the high power majority? A good solution in that situation is to make a positive impression by highlighting the rewards and personal satisfaction from doing something that may be slightly against the grain, or breaking the usual mold that fits so easily around the majority. An almost guaranteed win in that objective is to attain positive publicity for yourself and for the club. What that means in real terms is to place in a contest; to achieve recognition in DXing by working the rare ones, or attaining one of the many awards; to design and/or build something useful and interesting; to restore an old piece of equipment and show it off; or to participate in public service or general interest nets among your peers. A key ingredient for claiming success in any of these areas is to get your name in print. This can be a mention in the local club's newsletter or an article in a recognized national or international publication.

To do my job effectively, I have found that searching for interesting stories carries me beyond the traditional QRP arena. One example of that is the article in this issue by a ham who is a member of a group whose primary interests are vintage equipment operating AM, and they are well-publicized by an Internet presence. Following the publication of K0ETD's homebrew tube-based CW transmitter and his accompanying receiver in this issue of the *QRP Quarterly,* Ron (and his friends in his local AM group in Tuscon, Arizona) will achieve some international recognition. Do you think that might be a hot topic of discussion in their local meetings and nets? Take a look back through previous issues of this magazine, or in some of the other well-known publications, and you are likely to find a new author with an affiliation with a previously unknown (to you) group. Chances are, if the article is interesting, and with the ease of information seeking in the Internet age, you will do some searching to find out more about not only the subject, but also the author and his or her club.

The bottom line is that if you have an interesting, compelling story as a QRP aficionado, regardless of the seeming lack of interest among your local peers (possibly due to ignorance on the subject?), get it published. For you and your local club's visibility, the old saying, "A rising tide lifts all boats" certainly applies here.

Note: the group is at http://www.arizona-am.net/TUCSON/index.html

—72 de Ted, KX4OM

●●

From the President

Dick Pascoe—G0BPS

president@qrparci.org

WOW, fabulous, incredible, wonderful and exciting were just a few of the comments heard during FDIM this year. The line-up of speakers at the seminar looked great on paper before the event but on the day proved to be above and beyond expectations.

Dick, G0BPS, Ken, W4DU and George, G3RJV pose with a group of hams from India, led by Shri Suri, VU2MY, Chairman of India's national ham radio society.

I rarely get the opportunity to sit in on all of the presentations but always make a point of listening to Rev Dobbs, G3RJV. This year I managed to listen to almost all speakers and found each one to be informative and very well presented. I especially loved the presentation by Ward Silver, N0AX, with his "QRP contesting—it's not an oxymoron"! or otherwise "go play with the elephants."

A new venture for FDIM was the Q&A session with David Stockton, GM4ZNX. His session was due to end at 1600 but I allowed the audience to stay and quiz him for another 30 minutes before pulling the plug. He could have gone on entertaining the crowd for hours. He was amazed at the hospitality of the audience and the number of people that wanted his photo.

One strange thing that has happened over the last few years is that I don't have to go begging for people to come and speak at FDIM, they now come to me and ask if I can fit them in. I had most speakers already booked for 2009 before FDIM 2008 started!

The popularity of the Vendors night extended and most vendors brought their stuff in for the "meet the speakers" as well. This is not a problem, but at least one vendor demanded more space than he was allocated. Perhaps all vendors should remember that they are there by invitation and not by right! QRP-ARCI does not charge vendors for space as we consider it part of the service to members to have them there and also to thank the vendors for the prizes they have donated.

The major prize this year was once again an Elecraft K3, just the basic model though. We asked the most junior member there to draw the ticket, he handed it to me and as I read the winners call I had to hand the ticket to Eric from Elecraft to announce the winner, Jay Bromley, W5JAY.

We did well at the booth out at the small hamfest down the road with lots of renewals and quite a lot of new members signing up.

The highlight was a group of Hams from India, including Shri Suri, VU2MY (the Chairman and CEO of their national society), stopping by the booth. They had been looking for our booth as well as the G-QRP booth as they wished to meet Rev Dobbs, G3RJV, and also the senior members of QRP-ARCI. They wanted to offer their thanks for the way we had assisted them in getting equipment to India for young hams (see the photo).

Readers will remember my comments on the day out on Lake Erie I had with Bill, N8ET, and his great wife, Tina; this year they excelled themselves. After leaving Catawba Island we were followed by a RIB manned by the Coastguard. After a few minutes they slowed right down and stopped, Tina told me they had never been stopped by the Coastguard and had nothing to fear. As she said that they powered up and switched on their blue lights and came belting after us.

We were boarded by two very keen officers who proceeded to inspect our papers. They quickly identified my wife and I as English, but Bill and Tina had to produce ID.

Then the fun started, Tina is the safety training officer for the local Power Squadron, and as the officers asked to see their safety equipment, Tina beat them to it every time. "You will want to see this, and this, and that, have you seen this?" the officer with her VERY quickly came back up top. After a brief chat they left and raced off at very high speed.

So, to the 2008 Hall of Fame. Readers will remember my comments about the look on Hank, K8DD'S face when his name was called. The look of astonishment on the face of Ken Evans, W4DU, as he was elected to the Hall of Fame was a sight to behold. The standing ovation said it all. The long overdue election of Harry Blomquist, K6JSS (SK), was also a popular move, see elsewhere for more details.

You just know it is the right thing to do when the inductee is there in the room and keeps asking "why me?" I have been involved in the HoF for many, many years, and I think this is the very first time that there was a unanimous vote for a person.

See the following page for complete details about the Hall of Fame announcements.

—TTFN de Dick G0BPS

●●

Need QRP-related items?

Visit the QRP ARCI Toy Store at www.qrparci.com

Hall of Fame Inducts K6JSS, W4DU

Dick Pascoe—GØBPS
president@qrparci.org

About 11 years ago I had decided not to attend Dayton in 1997, costs were high and I had other priorities until an email arrived from the then President Mike C, WA8MCQ. I sat in shock staring at the screen of the computer as I read "you will be inducted into the Hall of Fame at FDIM, would you like Rev. Dobbs to collect your award for you?" Having showed the email to my wife, she looked at me and grinned "better book your flight now then hadn't you"—no-one but me was going to collect THAT award.

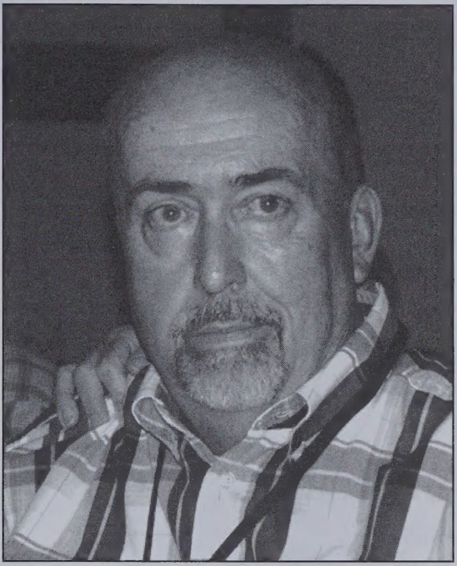
You never EVER really believe that you are entitled to be in the HOF, I certainly don't, but like all of those that have been inducted I am enormously proud that my peers thought me worthy. Chuck Adams summed up my feelings; "If you thought you should be in there; you don't deserve it."

So, to 2008.......

There were two people elected to the Hall of Fame 2008. Both were a "shoo in."

The first was Harry Blomquest (SK). His nomination reads as: "The QRP ARCI club was originally started up in 1961 with the idea of voluntarily limiting power to 100 watts to reduce QRM on the bands and make ham radio more enjoyable. (Hams used input power in those days, not output like we do now.) The name then, as now, was QRP Amateur Radio Club International. The goals were laudable, although it was not what we'd consider a QRP club nowadays. (Don't forget that the term "QRP" actually refers to a reduction of power, not a specific power level, although common usage of the term now usually refers to power levels of 5 watts and below. The name and goals of the club were in harmony with the definition of the term.)"

It may have just been a matter of time before a group such as ours had started, but it was because of the visionary efforts of K6JSS that the club came to being and has been able to grow to what it is today.



Harry was elected, perhaps many years too late to the QRP Hall of Fame 2008. The plaque was forwarded to his granddaughter after the banquet.

The next to be announced, to the obvious complete shock of the recipient was Ken Evans, W4DU. This was another of those "no brainers" that we get from time to time. With the work that Ken has done not only for the club but QRP in general he was another "shoo in."

Ken's nominations read as: "In all organisations there is a single character that sits behind the scenes and does a huge amount of work for the club. Very often the unsung hero of the club.

In QRP-ARCI we have one individual that has been working for the club for almost 20 years to my own personal knowledge. As one of the first FDIM managers he took over when the original crew stepped down. He has been a member of the Board of Directors, The club Treasurer and Secretary. He has worked tirelessly for FDIM for the past 8-10 years to my knowledge."

Another nomination said: "Within the club ranks, Ken has been on the BoD, the Treasurer, the Secretary, and currently serving as Vice President. He has worked tirelessly on FDIM including programs like the Build-a-thon that were enjoyed very much by the attendees.

Ken has been a QRP guest speaker at large hamfests such as Hamcom. Ken is also a goodwill ambassador for QRP, travelling many miles in the US and UK constantly helping other QRPers and QRP clubs when he can. Ken has been known to set up and work ARCI booths at Dayton, Dallas, Orlando, etc."

The third gave us: "In the ten plus years I have known Ken Evans, W4DU, he has made significant contributions to QRP clubs in general, and ARCI in particular. At the local level Ken was one of the club's founders and continues as an active member of the NOGA QRP club. He is a frequent speaker on QRP at local and regional Hamfests and radio clubs."

There are not many nominations that come with such a strong CV of work done and there are most certainly not many that ever get a 100% vote.

As president I just love those "gotcha" moments, in recent years there has been Ian, G3ROO; Bill, N8ET; Hank, K8DD; and now of course Ken, W4DU. The looks on their faces has been wonderful but only to those who know and have been looking.

This year the look of shock on Ken's face was amazing, his wife,, Lyn had to shake him to tell him it was true... He was still in a state of shock as he stepped up to the rostrum to collect his plaque.

In my years at the head of QRP-ARCI there have been a few moments of pure joy, giving the HoF plaques to Bill, Hank and Ken have far surpassed all others. They are all very worthy but Ken, W4DU, stands out above many.

—Dick Pascoe, GØBPS
President QRP-ARCI

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Idea Exchange

Technical Tidbits for the QRPer

Mike Czuhajewsi—WA8MCQ
wa8mcq@verizon.net

In this edition of the Idea Exchange:

- *Power Bounty from Consumer Products, N2CX*
- *Motel Power Supply from a Wall Wart, WA0ITP*
- *Manuals for the Simpson 260 VOM*
- *Counterfeit 2SC1969/2SC2166 Transistors, YO8CAN*
- *Test Adapter for the AADE L/C Meter, KC0WOX*
- *Measuring Twisted Wire Impedance, AC7ZN*
- *OzarkCon Dummy Load Special Antenna, WA0ITP*
- *Knob/Dial for Reduction Drive Capacitors, K3NHI*
- *Reforming Old Capacitors, K2GLO*
- *Homebrewing the Tayloe Detector, W0UFO*
- *No "Bull"*
- *Variations in Type 43 Binocular Cores, W8DIZ*

New WA8MCQ e-mail address! I have changed Internet providers. Readers should reach me at my new address: *wa8mcq@verizon.net*.

Power Bounty from Consumer Products

Also known as Joe's Quickie No. 66, Joe Everhart, N2CX, continues his endless series of Technical Quickies. (By mutual agreement, partly because it would date both of us, neither of us will make any "Route 66" references.)

Quickie 65 drew on consumerism to benefit the homebrewer by finding economical sources of audio amplifiers. Yet another class of useful consumer products is power supplies for MP3 players, cell phones and other electronic gadgets. These same power units can be used by the enterprising homebrewer for his own projects as well.

Portable electronics require batteries to operate them and will do so until safe fuel cells or other high density miniature power sources are developed. In the past single use batteries such as the rectangular 9 volt battery, AA and AAA cells served the purpose. Advances in battery chemistry have now made small, efficient, rechargeable battery packs practical. Battery chargers are provided with each product to keep them powered and ready for use.

Those of us with junk boxes full of wall-warts know that there used to be a wide variety of incompatible battery charger types. Fortunately, these days there is a good deal of standardization. Two of the more common voltages used are either 5 or 12 VDC. Further, the 5V often is supplied through a USB connector so that a computer can be used. 12V chargers frequently have a cable that can be plugged into the 12V accessory jack in an auto (in the old nicotine-stained days we called them cigar lighter jacks). 120V chargers often use the standard USB or 12V accessory jacks or plugs.

Common use of these charger types, fortunately for us hams, means that the chargers have now been commoditized so they are very available and, best of all, cheap. They are so handy that we might even consider using them as power sources by themselves in addition to use as chargers. However, if you do this be sure to test the power sources carefully before destroying any equipment or causing a safety problem.

The cheapie chargers often do not include voltage regulation so the voltage will vary widely with load. Additionally, they may not include much in the way of AC ripple filters. In the worst case they may also used an unsophisticated switching voltage conversion circuit that has no isolation transformer and may produce large switching frequency transients on the DC output.

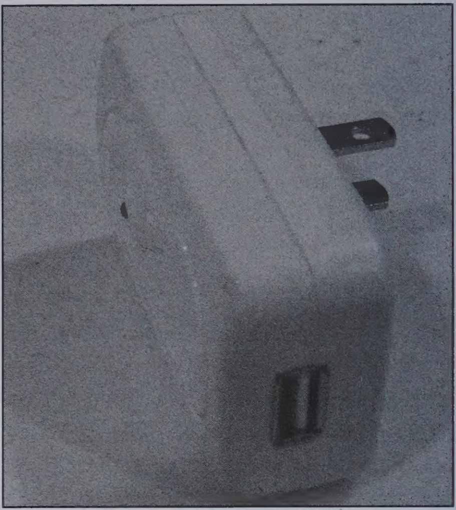

Figure 1—USB wall wart charger.

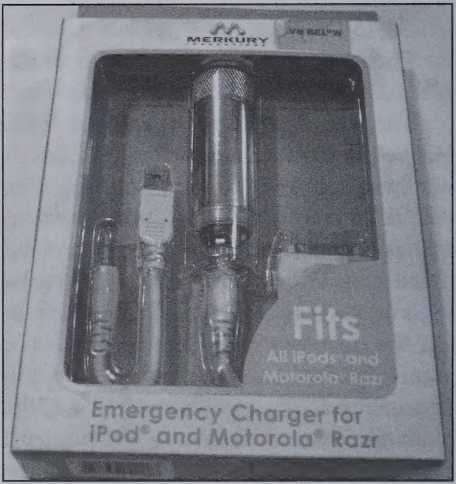
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Figure 2—AA-powered USB charger.

Some of the consumer electronic gadgets that can be charged from a USB port are MP3 players, digital cameras and some cell phones. While the voltage levels are 5V the connector types may be any of the several USB types. Figure 1 shows a 5V charger intended for MP3 players that Amazon.com sold briefly back in 2007 for about $3 each. In fact the shipping cost as much as the charger! There are no ratings marked on it nor were any specified on the Amazon site. However it does plug into a US-standard 120VAC outlet and it features a common USB series A connector (see Ref 1 for USB connector info).

Stores catering to the youth market

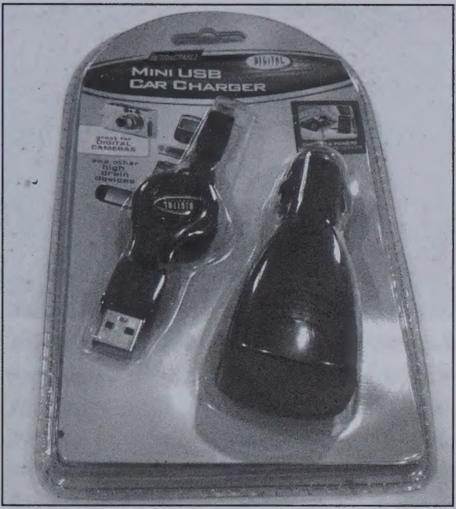


Figure 3—Automotive USB charger.

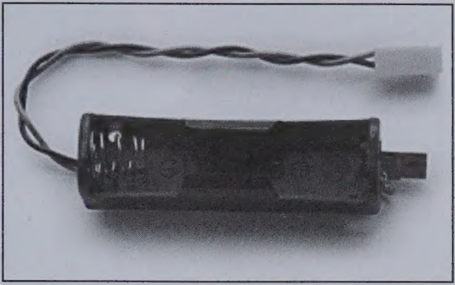


Figure 4—AA-powered 5V power source. (Photo used with permission of SparkFun Electronics.)

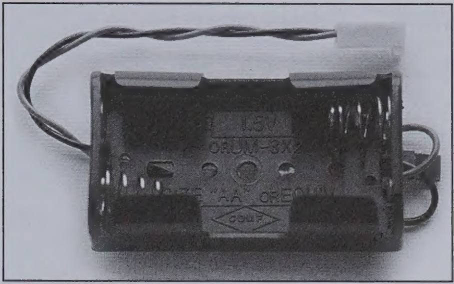


Figure 5—Dual AA 5V source. (Photo used with permission of SparkFun Electronics.)

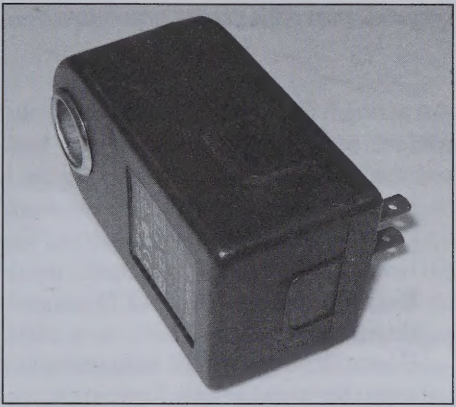


Figure 6-12V wall wart with cigarette lighter jack.

such as "Five Below™" also sell chargers in this category for—you guessed it—$5 or less. I've not used the devices as a DC source alone, but they have been handy for charging various MP3 players and digital cameras with no problems noted. Their light weight indicates that they probably use a switching type voltage conversion circuit, so pay heed to the above warnings before using them for anything other than battery charging.

Five Below also sells a different type of 5-volt charger intended for cell phones, illustrated in Figure 2. It is powered from a single AA alkaline cell and has a mini-USB connector. It is billed as an "Emergency charger" for iPods™ or Motorola Razr™ cell phones. Its output is an audio type jack, although both iPod and mini-USB adaptor cables are provided. It may or may not also be useful as a free standing power source.

For mobile use USB 5V chargers that plug into an auto's accessory jack are available. Figure 3 is one of these found, again, at Five Below. It plugs directly into an auto's accessory jack and circuitry inside converts the 12V input to 5V via a standard USB jack. The package includes an adaptor cable with a mini-USB plug. I have found it handy for charging digital cameras and for operating a GPS auto receiver.

Although not exactly consumer items, Sparkfun (Ref 2) sells some power sources functionally similar to the 5-volt chargers. They provide regulated DC outputs from AA cells through a small step-up circuit. Their model PRT-08248 (Fig. 4) provides a 5V output from a single AA cell while the PRT-08249 (Figure 5) sources 5V from two AA cells. Battery holders are part of the supplied assembly, and a small circuit board is mounted on the rear of the holder. Rated outputs are 100 mA for the single AA model and 200 mA for the dual with a typical ripple of 150 mV p-p at 135 kHz. They are certainly suitable for simple digital or microprocessor circuits where the ripple will not be a problem, although analog circuits may need filtering to clean up the voltage.

I've also run across 12V output chargers that show some promise. The photo in Figure 6 is one purchased from All Electronics (Ref 3). It plugs directly into standard 120V outlets and has what they call a "cig lighter" jack. It is rated to produce 12VDC at 500 mA though it is likely not regulated. Judging by its weight, however, it probably uses a good old-fashioned transformer and rectifier, so it will have line isolation and no high frequency noise associated with a switcher. It's very handy for all those things you would want to charge in a car or any 12V gadget that is not too fussy about the exact voltage or AC ripple. I've also used mine to charge 7AH gel cell packs directly with no apparent ill effects. Stores like Five Below sell a physically similar item as a charger, but, weighing only several ounces, it probably uses a potentially noisy switcher circuit.

References

1. See http://en.wikipedia.org/wiki/USB for info on USB interface and connector info.
2. Sparkfun Electronics, http://www.sparkfun.com
3. All Electronics stock number PS1206. http://www.allelectronics.com

—*DE N2CX*

Motel Power Supply From a Wall Wart

Terry Fletcher, WA0ITP, had a couple of posts on the 4SQRP mail reflector about a "motel power supply" and later put the info on his web site (http://www.wa0dx.org/wa0itp/, filed under "accessories, keyers, etc"). I couldn't find any earlier references to the term, but the concept is fairly obvious, a small, light QRP power supply for use while traveling. It couldn't hurt if it was something of very low cost so there would be no significant loss if it was left behind by accident.

With permission, here's the info from his web page:

> "Joe, W0MQY, and I were talking on PSK one evening about a regulated power supply for motel QRP ops. We thought that a wall wart might be a good place to start. So I scrounged around in the wall wart stash (we all have one don't we?) and found one rated at 14v at 700 mA output. That's nearly 10 watts so this thing should work. It's a GE model 5-2154C and I found a bunch of references using the Google and Yahoo

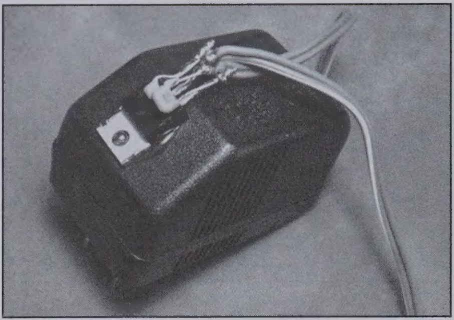


Figure 7—A 3 terminal regulator glued to a wall wart makes a handy power supply.

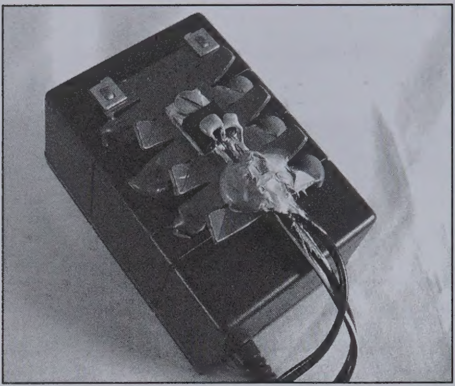


Figure 8—Putting out a fair amount of current, the Motel Power Supply uses a recycled heat sink on the regulator.

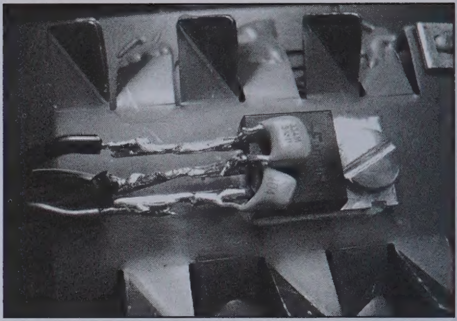


Figure 9—Close-up of the regulator wiring before insulating with silicone.

> search engines. Most were for sales offers for $2.99 new!!"

Testing with junk box parts is prudent so I hooked up a 27-ohm load and plugged it in. Fifteen minutes later the wart was just barely warm, and the load was too way hot to touch. The output was constant at 15 volts the whole time. That's a little over 8 watts so I figured it passed the test. Test results of the final configuration are listed at the end of this article.

I've built several wall wart power supplies in the past by just gluing a regulator on them and wiring it up. Figure 7 shows one I stuck together a couple of years ago for my NEScaf filter, a fine audio filter kit offered by the New England QRP Club. One thing to remember about warts is that they're usually only at the rated voltage when the output is at the rated current. Otherwise, they're over or under the marked voltage, depending on the load. This particular wart was rated at 9 volts at 200 mA. The NEScaf filter expected 12 volts at a light load, so I used a 7812 and it worked fine, with plenty of headroom for the regulator.

They've all worked well when built like this, so I thought I'd build the Motel Power Supply (MPS) the same way. Figures 8 and 9 are of the final MPS showing the wall wart, heat sink and 7812. I goobered up the wiring with silicone to stabilize and insulate it. The grey silicone is a nonacidic gasket-making product sold in auto supply stores, which works great for electronics. That's a 0.33 µF cap on the input and 0.1 µF on the output. Figure 9 shows detail of the wiring before adding the silicone. This regulator application would need a heat sink, and I happened to have one in the junque box. Mounting the regulator on it, epoxying it to the wall wart and wiring it up was an easy job. The blobs you can see around the edges of the heat sink are JB Weld epoxy.

Here are some test results:

Load: 440 mA
Regulator input voltage: 15.75
Regulator output: 11.95
Heat sink temp after 10 min: pretty warm but could keep a finger on it.

Load: 665 mA
Regulator input voltage: 14.73
Regulator output: 11.98
Heat sink temp after 10 min: very warm, couldn't keep a finger on it, but not destructive to the components.

The duty cycle of Morse is less than 100%, maybe about 70% (just a guess), so the MPS won't run this warm in actual practice. Last but not least, I checked out the ripple on the DC by listening with an audio amp, and nothing was heard. Not a scientific effort, but probably an OK method.

So there you have it. If you have a well stocked junque box, you can build it for nothing. It's cheap, easy, and works. All good ham radio attributes, but you've heard that from me before.

—DE WAØITP

Manuals for the Simpson 260 VOM

Many old timers will have fond memories of the Simpson 260 VOM which was pretty much the Cadillac of VOMs in its day, before digital meters took over the world. Actually, you don't have to be an old timer to use one of these. It's still available and still an excellent, rugged instrument that is in demand by many. A recent check of the Allied catalog shows that even the basic model currently sells for well over $200, and used ones are frequently available on eBay. Many would probably agree that the Simpson 260 falls into the category of Timeless Classic.

A lot of you will instantly recognize the device in figure 10. This particular version which I've had for at least two decades is the 5 series; think of that as "Rev 5.0." The current production model is the 260-8. (There is also a 260-9, which is an industrial version.)

There are good reasons that this and other analog meters are still around. Serious homebrewers know that while the digital meters are great, the analog ones are still useful as well. Ever try to tune or adjust something by using a digital meter and try to follow the bouncing digits? It can be done but it's slow and tedious. Even those that include a bar graph display fall short here due to the lag and low resolu-

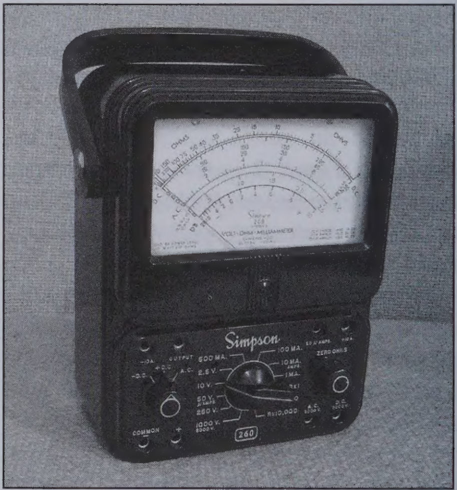


Figure 10—The classic Simpson 260 VOM. This is the 260-5, introduced circa 1969; the current production model is 260-8.

tion, but the analog meter really shines.

A while back, Mike Harrison, KE0ZU, posted this link to the Simpson web site on the Test-Equipment Internet discussion list.

http://www.simpson260.com/downloads/downloads.htm

A note on the home page indicates that the site is not associated with Simpson Electric, which makes the meters. Although the address mentions the 260, the site has manuals available for a wide variety of their VOM products, not just that one, and a note says that most of the manuals include parts lists and schematics. If you think the list of Simpson manuals is impressive, click where it says that more are available on page 2. That takes you to another huge list. And even if you pick up a really ancient Simpson meter somewhere, there's a good chance you can find something on it here; many of the manuals go back to the 1960s and 1950s. They even include the one for the original 260, dated 1939.

The site also includes old sales brochures and two editions of "1,001 Uses for the 260 Volt-Ohm-Milliammeter."

This is truly the mother lode of Simpson VOM information.

If interested in the Test-Equipment discussion list, you can find more info at

http://mailman.qth.net/mailman/listinfo/test-equipment

Counterfeit 2SC1969/2SC2166 Transistors

Counterfeit electronic components remain a problem, and you might sometimes see warnings from manufacturers or individuals. (Some I saw recently were from Micrometals, maker of powdered iron toroids, and Mini-Circuits.) This post from Romi, YO8CAN, appeared recently on the BITX20 forum on yahoogroups.com, with the subject line "Cheap 2SC1969, 2SC2166 may not work on 14 MHz." These are often used as final amplifiers in QRP rigs.

There are two kinds of 2SC1969 or 2SC2166 transistors available on the market: genuine Mitsubishi products, price about 10 or more US dollars, which deliver 4 to 6 watts out on 27 MHz, and others (price about U.S.$1) made by unknown producers (China), which are "lazy" at RF; they do not operate much above 7 MHz. Last year I bought many cheap 2SC2166 transistors. I tested and found that I could not use them above 3.5 to 7 MHz. The gain drops dramatically when increasing the frequency, becoming near zero above 10 MHz or so. I've found out that many other radio amateurs also bought 2SC1969 transistors, even some marked "MIT," but which proved to be counterfeits which did not work in radio frequency applications. I don't even know if they can support the rated 4 amps collector current, even at DC.

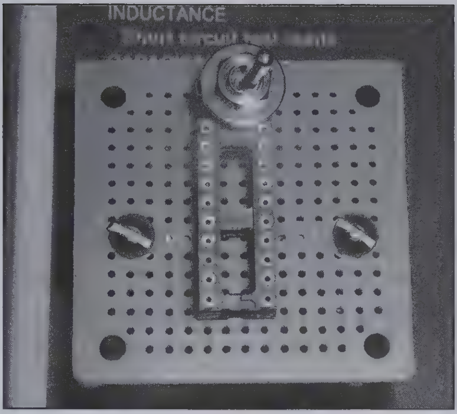


Figure 11—Test adapter for the LC/IIB meter includes a switch for easy zeroing.

[The BITX20 group is for discussion of the BITX20, a bidirectional SSB transceiver for the 20m amateur radio band, designed and built by Ashhar Farhan, VU2ESE, formerly VU2FAX.]

—DE YO8CAN

Test Adapter for the AADE L/C Meter

This popular tester for inductors and capacitors has been around for quite a few years, and many people have made test adapters for use with them. I always enjoy seeing the different ideas they have, and this one adds a new twist, a switch to short the contacts for the meter self calibration function.

Leonard Leeper, KC0WOX, posted a note about the meter to the BITX20 discussion group on yahoo.com and mentioned that he had details of an adapter for it on his web page, which he gave permission to include here (adapted slightly). If you want to see it online, go to http://golddredgervideo.com/kc0wox/lcmeteradapter. *—MCQ*

After owning and using an LC/IIB meter for almost a year and loving it, I wanted to eliminate the use of the 2 test leads that were supplied with it. They are only about 8" in length but the meter is sensitive enough that the lead positions affected the measurement values.

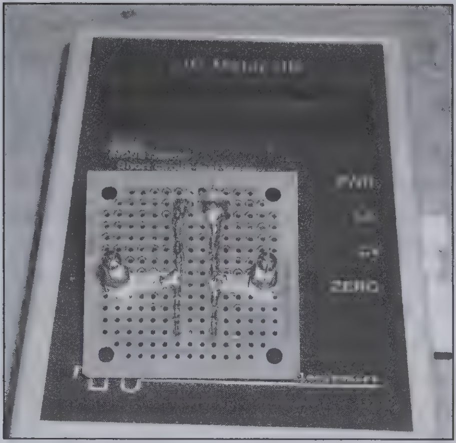


Figure 12—Rear of the adapter.

After some thought I came up with the adapter shown in Figure 11. The board has banana plugs on the rear so it just plugs into the front of the meter. The screws came with the banana plugs.

The adapter has an SPST switch so you can short circuit the input to perform the zero operation when measuring inductors or create an open to zero it for capacitance. The zeroing operation also zeros out any inductance and capacitance of the adapter. Use of a quality DIP socket insures durability if you measure a lot of components. If you use it continuously, I would recommend inserting another DIP socket into this one. Then a new socket upgrade would take just seconds. Remember, the meter will zero out any added capacitance or inductance.

If you don't like the style of plugs I used or can't find them, you can go to Abbatron's web site. For you old timers like me, the manufacturer used to be HH Smith.

[*WA8MCQ comments:* You can find the web page at www.abbatron.com. Look under Products, then "Uninsulated Banana Plugs" and then "Threaded Uninsulated Banana Plugs." Allied and Newark carry their products. You can also find banana plugs by various manufacturers at DigiKey and Mouser. Don't be scared off by some of the unfamiliar names; sometimes they are a well known product line that has changed owners, such as HH Smith. For instance, Emerson Network Power

Connectivity Solutions has what used to be the Johnson Components line of electronic connectors and hardware.]

I used 1/2 of a Radio shack 276-148 plug board to hold it all. While you are picking that up, you might look at the switch as well. You could buy your IC socket there also but I'd recommend using one that has the round machine pins because of the contact structure. They just grip the wires better.

Figure 12 shows the rear of the adapter. The easiest way to get the banana plug spacing correct is to plug them into the meter and then locate them by looking through the holes in the plug board. Don't solder on them when they are plugged into the meter though!

Make a solder bus between all of the pins and switch terminal on each side, connect to the banana plugs and you are ready to test.

—DE KC0WOX

Measuring Twisted Wire Impedance

The qrp-tech discussion list on yahoogroups.com was started up 3 years ago by Chuck Adams, K7QO, for discussions related to the technical side of QRP operating and building. In a recent post WB6TNL said that he bought some Teflon insulated hookup wire, was thinking about making a twisted pair feedline from it and wanted to know if there was an easy way to measure the impedance.

Glen Dixon, AC7ZN, responded with this—

If you have a scope an easy way, and one that has worked for me, is to drive a pulse into one end of a longish section and adjust a terminating potentiometer for maximum fidelity of the pulse at the other end. This will get you within about 5% and is fast and easy, especially if you already have a square wave or pulse generator (many scopes have square wave generators built in for probe calibration). But building a pulse drive out of 74AC series logic gates works very well and is not too hard. Source impedance, rise time, etc, don't really matter—just make the pulse/square wave coming out look just like the pulse going in.

If you need closer results you can do things like minimizing or compensating for scope probe capacitance, or looking for the reflected pulse at the input by sourcing the original pulse through a resistance and probing just after the resistor—a poor man's time domain reflectometer. Any reflected energy will go to zero when the cable is terminated at the far end in it's characteristic impedance.

If you only have, say, an RF probe, you can use a sine wave generator and feed the output through a resistor into the cable. Terminate the cable in a resistor of the same value. Measure the voltage right at the source, then after the source resistor at the point where the sine wave enters the cable. Step the source and load resistors up/down, always keeping them the same value, until exactly half the RF voltage is dropped across the source resistor. Your resistor will be the characteristic impedance of the line. Repeat at another frequency (maybe 15% different) to make sure the voltage drop is still half and you aren't just looking at an SWR anomaly.

—DE AC7ZN

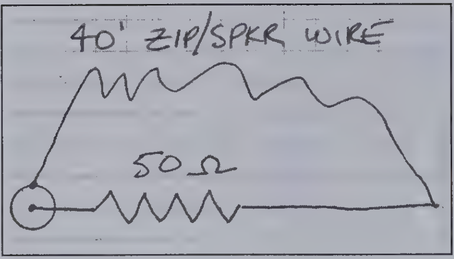


Figure 13—Schematic of the dummy load antenna.

OzarkCon Dummy Load Special Antenna

While looking at the WA0ITP web page I noticed something else that I thought was a very interesting idea:

Last year at OzarkCon 2007 a Dummy Load QSO Party was held, and a tradition was begun.

Prior to OzarkCon 2007, several noted QRPers had expressed an interest in operating during the event. Setting the ball in motion, Bart, W0IIT, obtained the special event call K0N for use during the conference. It was decided to hold a Dummy Load QSO Party for the attendees wherein they could contact it from their motel rooms during the conference. It was very successful and many contacts were made with K0N as well as room to room QSOs. Special K0N QSL cards were distributed for those contacts. K0N contacts were made across the country as well, since the special event station had an outside antenna. The Dummy Load QSO Party is thought to be the first one of its kind, at any conference.

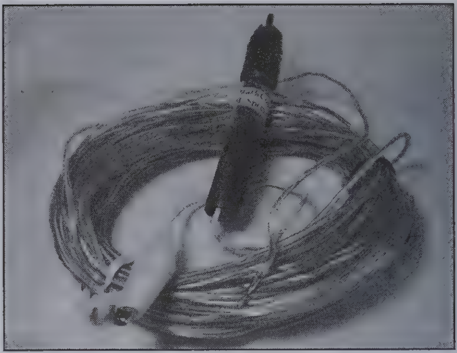


Figure 14—The dummy load antenna coiled up for storage.

However, some of the Dummy Load contacts were nearly ESP due to the semi-shielded nature of the dummy loads in use. The antenna described here provides much stronger signal strength while staying within the concept of a dummy load antenna. Figure 13 shows the schematic and Figure 14 shows the real thing.

Both leads of the zip cord/speaker cable were twisted and soldered together at each end. One end of the wire is soldered to the 50-ohm resistor, and the other end is left loose for easier coiling/uncoiling. The alligator clip is used to clip the loose end of the wire to the ground side of the connector. I tried it with both ends soldered but always seemed to wind up with a knot.

This "pseudo" antenna has proved itself from a motel room at the 2008 St. Joseph, MO hamfest site. Joe, W0MQY, heard it plainly 3 blocks away from the motel. At –10 deg F he was too cold to attempt a QSO, but declared the signal plenty loud enough for one, and S9+ in the motel's parking lot. So with that performance I herby name it the OzarkCon DL Special and invite all to duplicate it for the upcoming 2008 OzarkCon Dummy Load QSO Party. Just tape it on the wall in a big rectangle and have at it.

—DE WA0ITP

Knob/Dial for Reduction Drive Capacitors

Some air variable capacitors have built-in planetary reduction drive mechanisms to give them slower tuning. They have a coaxial shaft; sometimes the two portions are the same diameter, and sometimes the slower direct drive portion is

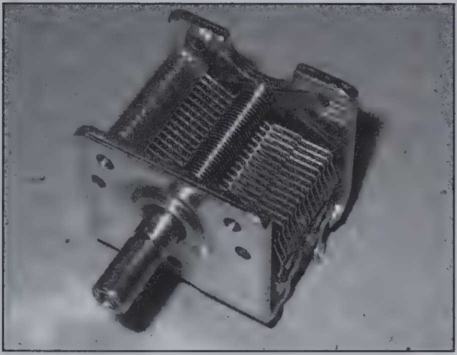


Figure 15—365 pF air variable with built in reduction drive.

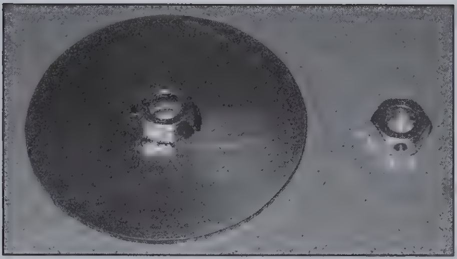


Figure 16—A disk cut from PCB material plus a modified brass nut make a dial plate or large, thin knob.

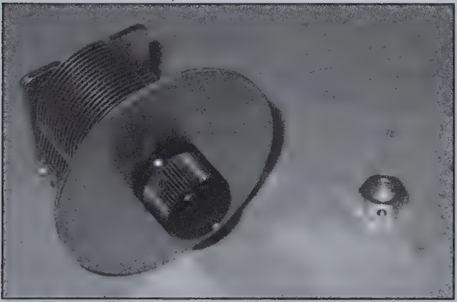


Figure 17—Mounted to the rear shaft portion, the disk can be used as a fast tuning knob or dial plate.

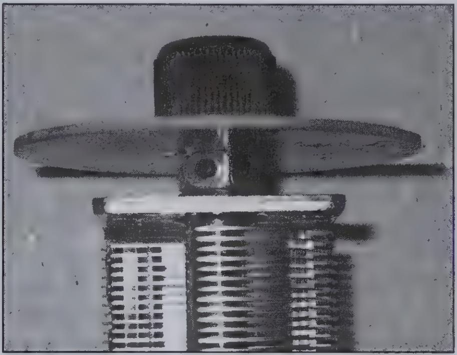


Figure 18—Top view of the two speed knob set.

larger. Either way, it can be difficult to attach a pointer or knob to them. Bob Kopski, K3NHI, recently posted this to the EMRFD discussion group on yahoo.com. It can be used either as a knob or dial plate. *—MCQ*

The 365 pF air variable is a classic component and is still available from a few suppliers. One of these is the Crystal Set Society and their web site (www.midnightscience.com) is worth a visit. These folks are very nice to do business with—friendly and speedy service is what I've found every time.

More recently this supplier has listed a 365 pF air variable with built in 8:1 coaxial reduction drive, shown in Figure 15. I got one to play with and decided to fit it with both "large" and "small" knobs—"two speed" drive so to speak. But this was a challenge because the coaxial shaft arrangement has rather short sections to work with.

The inner or direct drive shaft is less than 0.2" long while the outer or slow speed drive is about 0.4" more. It's easy to install a knob on the latter (reduced speed) shaft but quite another thing to utilize the former. I feel both shaft sections need to be about 1/2" longer than they are to allow full utility with panel mounting ease and more practical knob options.

That notwithstanding, I set about to make a "two knob" tuning arrangement. As shown in Figure 16, I cut a 2 1/4" disk of double sided PC board to serve as direct drive inner or large knob, or as a dial plate alternative. I used a 1/4" × 20 brass nut to mate the disk to the short part of the shaft. The nut is drilled thru with a 1/4" bit, and then cross drilled and tapped with a 4-40 thread to accept a set screw. The nut is then spot soldered to the disc.

When this combination is installed on the inner or direct drive portion of the coaxial shaft, a conventional knob can be attached to the slow speed shaft portion. Figures 17 and 18 show the finished product. The result is a dual speed (two knob) tuning option.

While this homebrew approach is workable, I feel it is unfortunate that this 365 pF classic with its too-short shaft arrangement makes things so difficult. With the shaft section lengths as described, there is not much room left to accommodate panel thickness, and the 1/16" thick PC board "knob" is not pleasant to the touch. Nevertheless, this appears to be a workable "workaround" and this capacitor is destined for rapid deployment in a new homebrew project!

—DE K3NHI

WA8MCQ comments: When I commented that the unpleasantness of the edge of the large knob could be reduced by sanding it smooth, Bob replied that he had not used fiberglass PCB stock as I assumed. He had cut it from double-sided phenolic board from Radio Shack, which can be smoothed with relative ease if needed, but does not have the rough edge of fiberglass. He was referring instead to it being so thin. "One uses fingertips to turn it so it does not have the more comfortable feel of a knob of greater depth."

If you don't want to make your own collars from nuts you can find them ready made, although you do need to get something that can be soldered easily. The Small Parts, Inc. web site (www.smallparts.com) has brass shaft collars, although they are nickel plated. That makes them more difficult to solder unless you file off a bit of the plating. They would also require a bit of work for use with this particular cap since none have dimensions that allow them to be used directly.

The midnightscience.com web site has had regular 365 pF capacitors without the reduction drive for a number of years. Another source of variable capacitors is Antique Electronic Supply, http://www.tubesandmore.com. Most are rather pricey, but they do have some bargains if you don't mind units of the sort that used to be used in consumer grade AM/FM receivers.

If you have access to back issues or to the *QRP Quarterly* DVD/CD set, I had an item in the Idea Exchange in the July 1995 issue along similar lines, describing an idea given to me by Doug Hendricks, KI6DS.

Reforming Old Capacitors

I'm going to take the high road and refrain from making comments like "you do it by sending them to reform school!" (I think I just dated myself again. They don't officially call them that any more, although they do still exist. If not familiar with the term you can look it up on wikipedia.org.)

The problems with old electrolytic capacitors are well known, and if a piece of equipment with them has not been turned on in a very long time they have to be reformed. (It might be better to pronounce that as re-formed to avoid any confusion.) Otherwise they might fail spectacularly when power is applied, especially if used in high voltage circuits (think "vacuum tube equipment"). Walter Dufrain, K5EST, read a good post about it elsewhere and passed the word along to the 4SQRP list.

It came from the AMRadio group, which has the stated purpose of "Discussion of AM Radio in the Amateur Service." You can find info on it at http://mailman.qth.net/mailman/listinfo/amradio. I took a quick look at some of the archives and signed up on the spot. Even if you are not into the AM and nostalgia thing there is still a lot of good discussion on older equipment and technology in general. The main web page of the group is http://www.amfone.net.

This was written by Bob Deuel, K2GLO, and appeared on the AMRadio list on June 7, 2008, with the subject line "RE Electronic Capacitor Reforming." —*MCQ*

There has been a lot of discussion regarding electrolytic capacitor leakage. Here are the "official" specifications. The JAN-C-62 specification addresses the maximum acceptable allowable leakage for electrolytic capacitors. (There is also an EIA specification but it is the same as Jan-C-62.) The formula is I = (K)(C)+0.3 where "I" is the maximum allowable leakage current in milliamperes, "C" is the capacitance in µF, and "K" is a constant relative to the working voltage of the electrolytic capacitor. "K" = 0.01 for voltages up to 100 volts; "K" = 0.02 for working voltages between 101 and 250 volts; "K" = 0.025 for working voltages between 251 and 350 volts; and "K" = 0.04 for working voltages between 351 and 450 volts.

Here are some examples: a 20 µF at 450 volt capacitor has a maximum acceptable allowable leakage current of (0.04)(20)+0.3 which works out to 1.1 mA, while 20 µF at 250 volts would have a maximum acceptable allowable leakage current of (0.02)(20)+0.0.3 which works out to 0.7 mA. As you see by the formula, the allowable leakage is proportional to the capacitance.

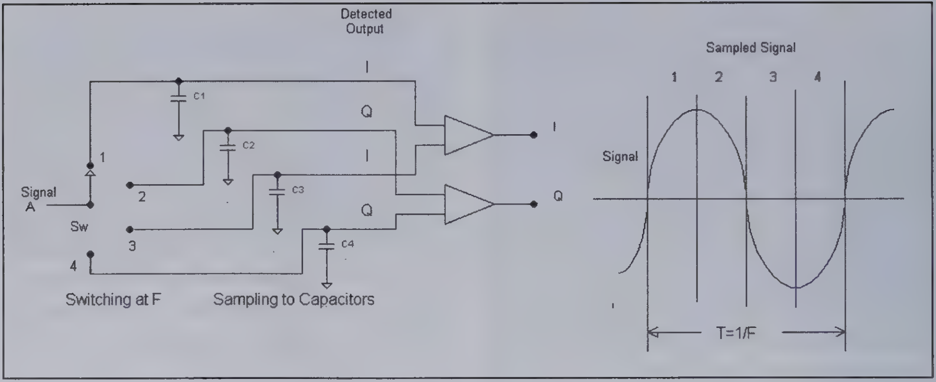


Figure 19—The Tayloe detector.

It seems that everyone has their own opinion and method on reforming so I will throw mine in the pot since it works well for me. I sell NOS electrolytic can capacitors so I built a couple of custom reformers to condition them. *[NOS is "new old stock," things which were made long ago but have never been removed from the original package.—MCQ]* One is for 150 volt cans and the other for 450 volt cans. Each reformer can reform up to 30 electrolytic sections at a time. I will only discuss the 450 volt reformer. It is basically a 450 volt supply that is regulated so it does not exceed 450 volts as the reforming currents decrease. Each of the 30 reforming legs has a 90K current limiting resistor in series with the capacitor which limits the current to 5 mA in a short circuit condition. Typically an unreformed capacitor will draw about 2 to 3 mA initially and leakage current usually drops off considerably in the first few hours.

I can monitor the leakage current of each independent reforming leg with a 30 position switching system. The meter is switchable to read full scale currents of 8 mA, 1.6 mA, 0.8 mA and 0.16 mA. As an example, an unreformed capacitor that starts off drawing 2 mA will only have 270 volts applied to it because of the current limiting resistor. As the capacitor reforms, the leakage current decreases and the voltage [at the capacitor] increases upward to 450 volts.

Many of my 20 µF capacitors will reform to leakage values well below 0.05 mA at 450 volts. I typically reform my capacitors for 3 days and then, in addition, operate them at a full 450 volts for an additional 4 to 7 days to endurance test them. One advantage of the 7 to 10 day reforming and endurance testing period is that on rare occasions some electrolytic fluid will weep through where the terminal penetrates the bottom seal. The extended testing period allows this condition to manifest itself. The 5 mA current limit is pretty safe and I have never had a capacitor explode on me even when they have had excessive leakage. I have reformed many capacitors using the above method. I find they respond very well to it.

[*WA8MCQ notes:* I remember building a capacitor reformer in my college days, before I entered the Air Force in 1970. As I recall it used a string of neon bulbs to form a crude indicator of the voltage across the capacitor. Let it run until the voltage across the cap rose to the appropriate value—switch selected—and disconnect. I could have used a VOM and pair of test point jacks or even a dedicated panel meter, but the neon "bells and whistles" were much more fun! Bob later told me that he had built the same unit, which appeared in Popular Electronics, and that it was never a particularly good device. Unfortunately, that was also my impression.]

—DE K2GLO

Homebrewing the Tayloe Detector

Designed several years ago by Dan Tayloe, N7VE, the Tayloe Detector has become well known in homebrewing circles; information on it can be found by following the link given in the notes at the end. (It also was awarded US patent #6230000, one of over 40 patents that Dan holds.)

Mert Nellis, WØUFO, sent in these notes about the detector—

After looking at spectrum display receivers like the SoftRock (notes 1 and 5) and the Time Machine (note 2), I got the urge to try some homebrew. The Tayloe Detector (note 3) used in the SoftRock was intriguing so I did some research and found that the local oscillator control for

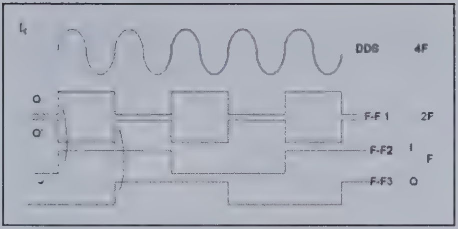


Figure 20—DDS at 4F, divided by four to get I and Q at F.

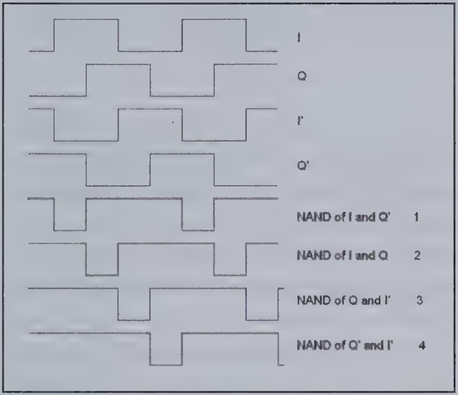


Figure 21—From I, I' and Q, Q' to 4 phases for switches.

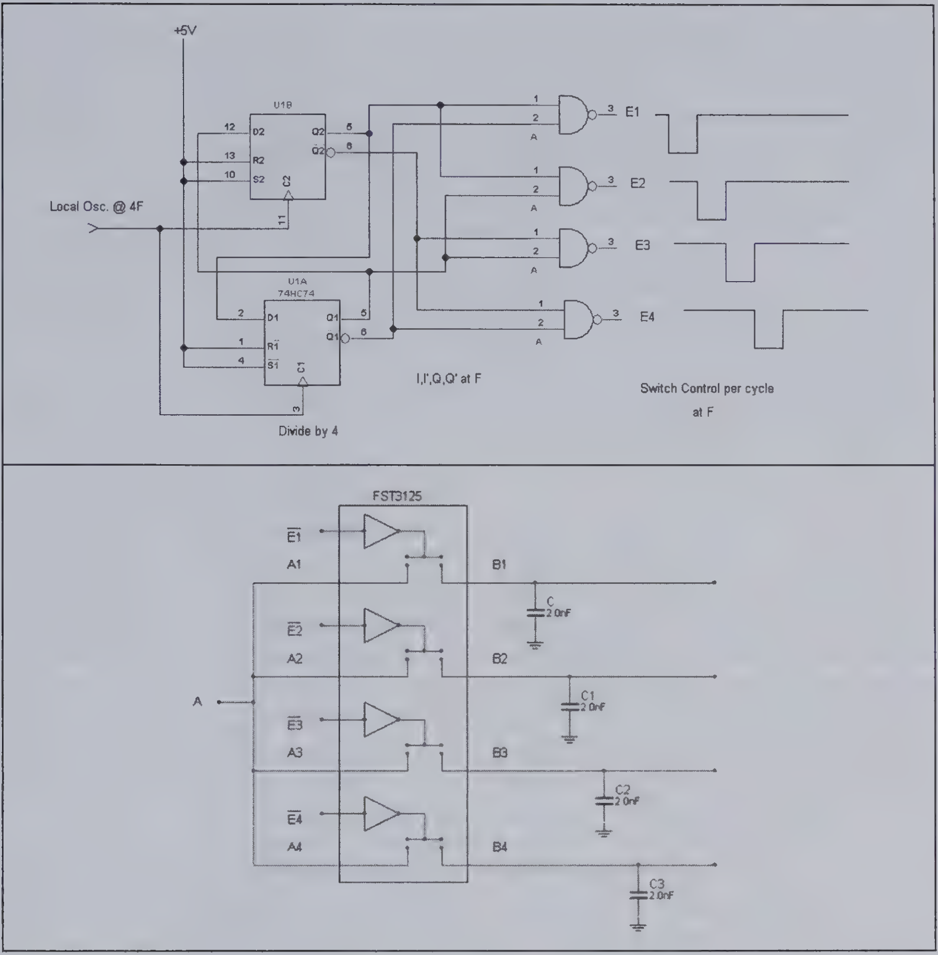
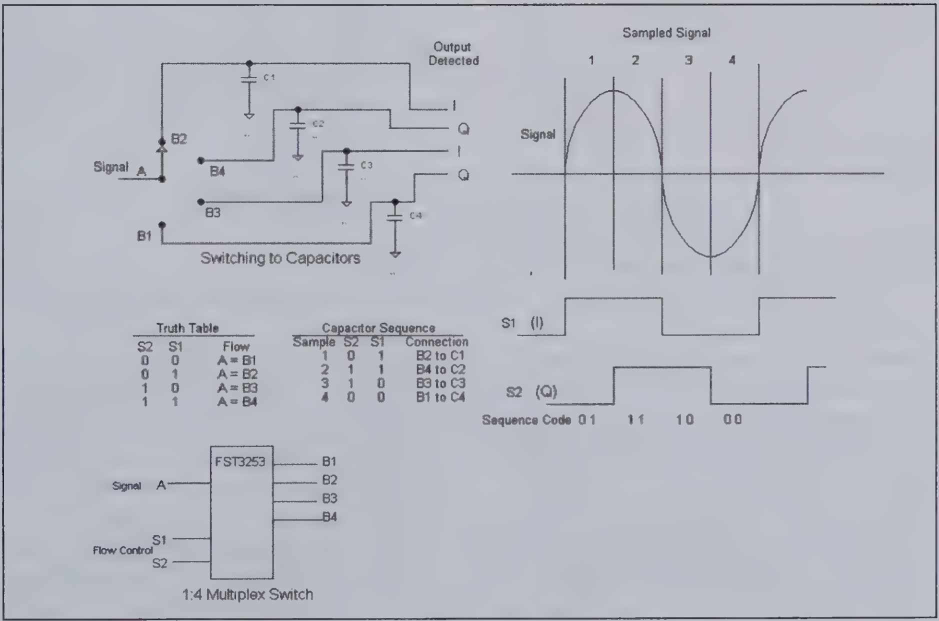


Figure 22—Switch using 4F to get 4 phases at F for switching.



Truth Table

S2	S1	Flow
0	0	A = B1
0	1	A = B2
1	0	A = B3
1	1	A = B4

Capacitor Sequence

Sample	S2	S1	Connection
1	0	1	B2 to C1
2	1	1	B4 to C2
3	1	0	B3 to C3
4	0	0	B1 to C4

Figure 23—A switch that uses I-Q at F.

the sampling switch was the most challenging.

The basic Tayloe circuit is shown in Figure 19. The switch connects 4 samples in sequence from the incoming signal to storage capacitors. These samples are used by the following amplifiers to form the in-phase (I) and quadrature (Q) base-band signals. The baseband I-Q output from the amplifiers can be sent to a computer sound card where software like Rocky (note 4) uses digital signal processing to display (and hear) a spectrum of radio frequencies.

The local oscillator frequency must produce the 4 phase control signals for the 4 switches. An oscillator running at 4 times the signal can be divided down with flip-flops to get the I-Q square waves, Figure 20, and Figure 21 shows how I-Q square waves can be gated to get the 4 phase pulses for switch control. Figure 22 shows such a system with 4 phase control of an integrated circuit switch, the FST3125 (Fairchild Semiconductor, 4-bit bus switch). Notice that I and Q are available from this circuit before the NAND gates. The I-Q square waves can also be used directly to drive other types of mixers that require quadrature drive or they can drive an FST3253 (dual 4:1 multiplexer/demultiplexer bus switch). *[Both devices are currently in full production according to the Fairchild web site.—MCQ]*

The FST3253 uses a two bit code for control as shown in Figure 23. The code can be produced from I-Q square waves at the same frequency as the signal. I-Q

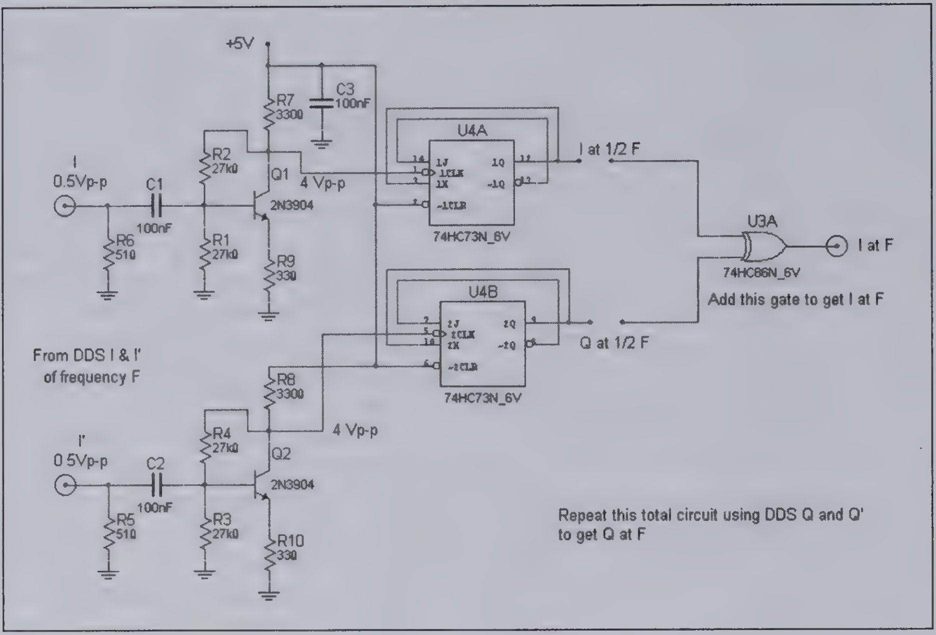


Figure 24—A circuit that can either give I-Q from I-I' at 2F or a square I from I-I' at F

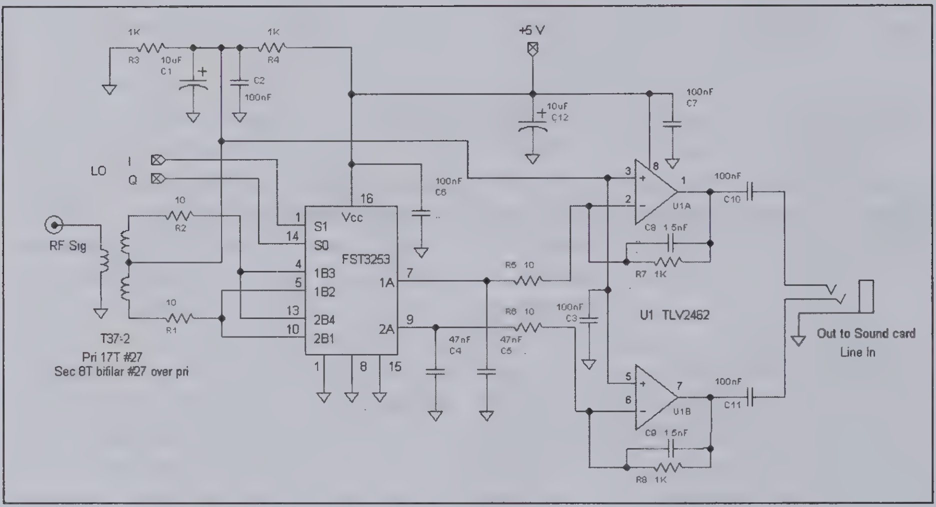


Figure 26—A quadrature sampling detector circuit.

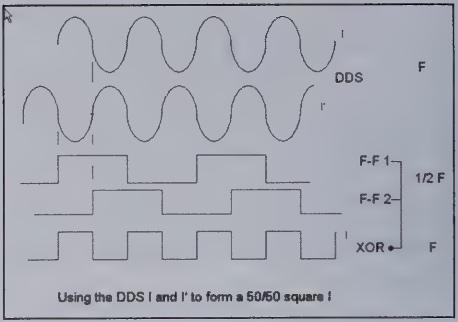


Figure 25—Using the DDS I and I' to form a 50/50 square I.

square waves can be produced by flip-flops starting at either 4F or 2F as shown in the circuits. A DDS can be used to produce quadrature square waves. If the DDS has I and I' (I complement) output it can run at 2F with two flip-flops to get I and Q at F as shown in Figure 24. Figure 25 shows some associated waveforms. The DDS30 or DDS60 that have I and I' can be operated in this manner.

In a more elaborate circuit, adding an XOR, an I-Q DDS with I, I', Q and Q' can output I and Q at the signal frequency, F. An I-QVFO or I-Qpro (note 6) can input to the circuit suggested in Figure 24. But to get both I and Q, two identical circuits, one from I-I' and the other from Q-Q' must be operated. It would be nice if someone would make available a DDS with quadrature square wave output to eliminate the need for these additional circuits.

Of course, when using these schemes for a spectrum display, a crystal oscillator at a fixed frequency may be all that is required but a DDS allows the center frequency of a display to be set anywhere in any band. The above circuits give the home brewer many choices.

I have been using the circuit of Figure 24 to operate a quadrature sampling detector (QSD) like that in the SoftRock RxTx6.2 from an I-Qpro. The I-Qpro provides 1/2-volt peak to peak to drive amplifiers and flip-flops. Figure 26 shows a QSD similar to that of the SoftRock that has a center tapped input transformer and switching that sums into only two capacitors so that single supply amplifiers can be used. This works well on 80 thru 20 meters. I have not optimized it but it gives a platform for experimentation.

Notes:

1. SoftRock, http://www.groups.yahoo.com/group/softrock40.
2. Adams, Chuck, K7QO, *QRP Quarterly,* Winter 2008, Product Review: The Time Machine
3. Tayloe, Dan, N7VE, Ultra Low Noise, High Performance, Zero IF Quadrature Product Detector and Preamplifier, http://wb9ipa.qrpradio.com/60meter/exciter/Tayloe_mixer_x3a.pdf.
4. Shovkoplyas, Alex VE3NEA, Rocky Software, http://www.dxatlas.com/rocky.
5. SoftRock Radio, http://www.softrockradio.org.
6. Johnson, Craig AA0ZZ, I-Qpro, http://www.cbjohns.com/aa0zz

—DE W0UFO

No "Bull"

The Fall 2007 *QQ* issue had an antenna item from long-time QRPer W8IJN (formerly WB8IJN), who I identified as Nils "Bull" Young. In the following issue I printed this correction, at the end of an antenna article that was inspired by his:

"…In my intro I gave his name as Nils "Bull" Young. He recently sent me e-mail which indicated that it should not have the quote marks; it should read Nils Bull Young. (Long time members of the QRP-L Internet mail reflector will remember the

OLE BULL
STATE PARK
DEPARTMENT OF CONSERVATION & NATURAL RESOURCES

Figure 27—K3MRT and W3REN prove that it's no "Bull."

name well.) He indicated that many people think Bull is some sort of nickname (as I did). He said that for his father in the military it was, but that the Bull in his name is a family name from the 1500s in Norway. He included some interesting family history as well as several very old photos to prove that it's all no bull. (Don't blame me—he said it first!)"

I subsequently received the photo in Figure 27 from Joe and Mary Jo Valasek, K3MRT and W3REN. They said, "Here's proof W8IJN spoke the truth about his name. Some of his heritage still exists in northern Pennsylvania." (You can look up the name on the sign on Google or other Internet search engine.)

PS—spell checkers on computers are great, but apparently that's a "resourse" that the sign maker didn't have available!

Variations in Type 43 Binocular Cores

As operator of a small business selling parts to QRPers, Dieter Gentzow, W8DIZ, buys a lot of ferrites of various types. A while back he noticed that his latest shipment of type 43 binocular cores looked a bit different, which resulted in a post to one of the QRP discussion groups. This is adapted from that, along with comments in some e-mails. (Keep in mind that this applies only to type 43 ferrite in binocular core form; it does not apply to type 43 toroids.)—*MCQ*

Not too long ago, I purchased a large quantity of BN-43-202 binoculars from Fair-Rite. The parts measured 220 µH per 10 full turns which gives them an A_L value of 2200.

I later ordered another large quantity of the same part. I noticed that the part looked slightly different, not as bright and shiny; so I tested a few pieces. Ten turns for the newer binoculars measured 380 µH. I was expecting maybe ±20 percent tolerance variances but this was a bit much.

I talked to a Fair-Rite application engineer, and he told me that they do not even measure inductance for the type –43 material. They do not publish an A_L value for –43 material binocular cores.

Note that Fair-Rite (who supplies me and other vendors such as Amidon) farms out their parts manufacturing to different companies. In the past, most of their products were manufactured in the USA. Now their packages state "MADE IN CHINA"; and even from China I've seen huge variations, both physical and electrical, in the same product. So, do not expect type –43 material ferrite binocular cores to be consistent. Just a heads up.

Fair-Rite does publish A_L values for –61 material binocular cores. There are other distributors of Fair-Rite parts that publish the A_L values of –43 binoculars, but the A_L values did not come from Fair-Rite. In my case, I just measured 2 or 3 samples and published the results.

Many of us design transformers to operate at a specific frequency and impedance and use the rule-of-thumb that the impedance of a transformer winding should be 4 times the operating impedance. A –43 type transformer winding connected to 50 ohms at an operating frequency of 1.8 kHz should have a minimum inductance of 17.68 µH, so, practically speaking, a 160-10 meter 4:1 balun needs 18 µH on the 50-ohm winding. That is about 3 turns.

My original measurement of a BN-43-202 binocular showed an A_L value of 2200. Subsequent measurement of a new batch of BN-43-202 parts show an AL value of 3800 since µH = (A_L*Turns^2) / 1000.

The inductance value ratios using the same number of turns is 1.73 to 1. In other words, the new 3800 A_L value parts will show 1.73 times the inductance of the original part. Had I designed the transformer with the A_L value of 3800, I would have used 2 turns of wire. So you see the potential problem.

—DE W8DIZ

The fine print

Have any ideas, circuits or stories you want to share? Send 'em in. They can be via e-mail, floppy, CD, even handwritten, and you don't have to worry if you're not a professional writer. We take care of any editorial duties required. See something good online that's worth sharing, either on your own web page or someone else's? Let me know the URL, and I'll take it from there. (Permission is usually easy to get.) And although some people provide their own computer-generated graphics, you can just send in a hand-drawn schematic if you like, and I'll be happy to draw it up myself. Whatever it is, if it's something that our readers would find interesting, just get it to Severn one way or another; operators are standing by!

●●

Quick QRP ARCI Membership Quiz:

1. Are you reading someone else's copy of *QRP Quarterly*?

☐ YES — It looks like you need to become an active member and receive your own copy! Subscribe today using the form on page 64, or online at www.qrparci.org

☐ NO — Thank you for supporting *QRP Quarterly* and QRP Amateur Radio Club International!

Remember—

Your membership number never expires...
...but your subscription to *QQ* does!

FDIM—The Experience

Dick Pascoe—G0BPS; Ken Evans—W4DU

When we first started coming to Dayton for the Hamvention a few rooms were booked at what was then the Belmont Hotel in downtown Dayton. The hospitality suite was very different to what we have today; first it was on about the 10th floor and we seem to remember the windows being opened. Antennas flourished, and many stations enjoyed the surrounding site. The cold beer in the fitted kitchen sink along with the ever lasting supply of delivered Pizza kept us going for hours.

It wasn't until 1996 that a few stalwarts of the club decided that they would start this strange event called "Four Days in May"—who would believe that the expected 30 members actually became just over 100. That first FDIM was a resounding success and each year it has beaten the expected results by several fold.

So, to this latest FDIM... Firstly, without an outstanding manager it would not happen! There have been several over the years with the latest being Norm Schklar, WA4ZXV, who follows in the path of his predecessors in being above excellent.

The manager is in charge of ALL events/happenings at FDIM and though he/she may delegate, it is their responsibility to ensure everything goes to plan. Norm has pulled this off to a "T" and should be highly congratulated for all he does.

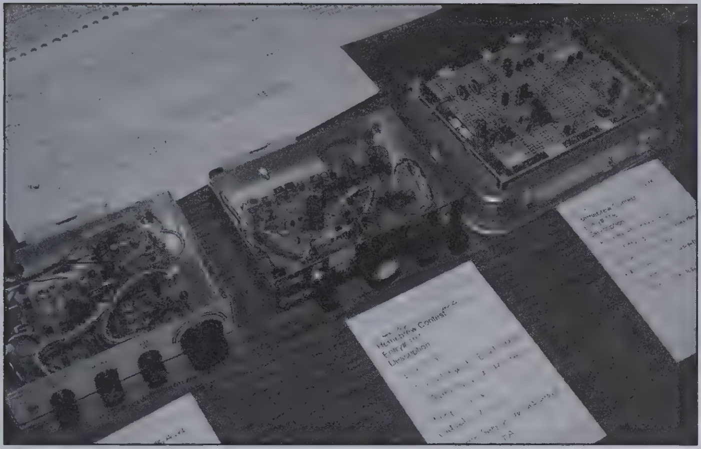
This year was better than last, which was better than the year before. We had over 240 people at the seminar and 250 at the banquet. More people than past events. We have no idea how many people attended the free events during Thursday and Friday evening, but all will agree that they were a big crowd. Thanks to our QRP Vendor/Sponsors, we had over 70 prizes to give away at Saturday's banquet.

And guess what? Next year will be even better! We don't have a formula for how it happens, but it just happens. A year or so ago the President of ARRL, Jim Haynie, came to our booth and asked us "just how do you get members to come on a Thursday?" We explained that you have excellent seminar speakers, high quality QRP vendors, superb entries in a home brew contest, and a crowd of attendees that enjoy being together and sharing informa-

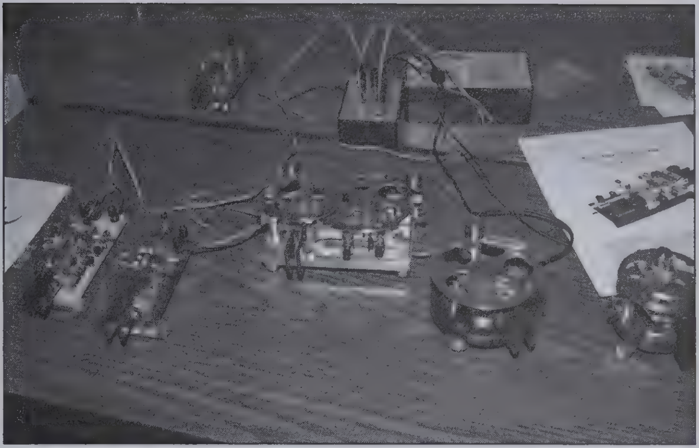
Over 240 people enjoyed an informative seminar.

The Awards banquet had 250 enjoy good food, good friends, awards and prizes.

Alternative activities for spouses has become an FDIM tradition. Here a few add the extra stitch to their projects.



Many excellent Homebrew Contest projects—some even used a cake pan for a chassis!



Richard Meiss, WB9LPU, continues to dazzle us with high quality home brew paddles!

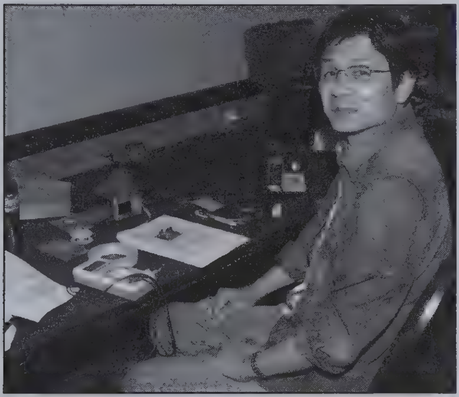
tion. He just couldn't believe us. We suggested he came to visit and see for himself.

That's what we suggest if you haven't attended FDIM. Come and see for yourself! The seminar alone is worth the trip. This year we had seven speakers cover a diversity of topics. The QRP vendors/sponsors donated excellent prizes, and the entries in the home brew contest were pristine! (See details elsewhere in this issue.)

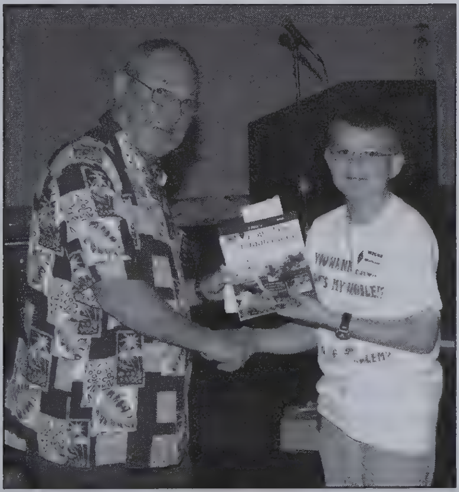
FDIM is an experience made enjoyable not only by the hard work of the volunteers, but by the enthusiasm of the people attending as well. It is said that a picture is worth a thousand words. The pictures here from this year's FDIM will hopefully convey the enthusiasm.

Come next year and join us. But warning—it is addictive!

●●

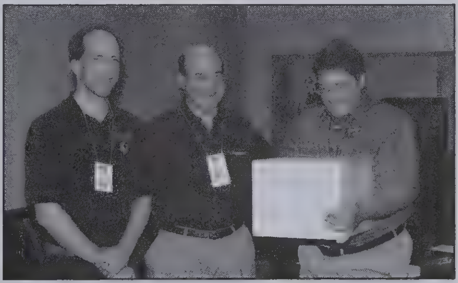


All the way from Japan, Tak, 7L3DNX completes the buildathon amp.

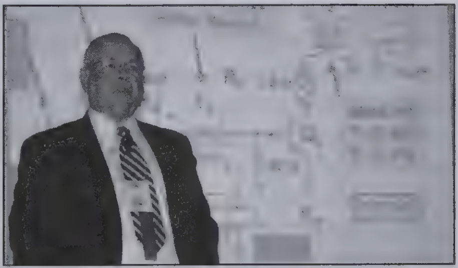


Dick Pascoe, G0BPS, QRP ARCI President, presents one of our younger members, Michael Bayern, W2CVZ, with one of the many prizes

Norm Schklar, WA4ZXV—FDIM Manager takes a moment to enjoy!



Jay, W5JAY wins the K3!



Jim Everly, K8IKE, explains the buildathon project at the Thursday seminar.

Who says the FDIM Buildathon is a man's game?

George Dobbs, G3RJV, as always entertains and informs at the seminar.

Life is Too Short for QRO

George Dobbs—G3RJV

"To the man who only has a hammer in the toolkit, every problem looks like a nail." —Abraham Maslow

After my presentation in last year's FDIM, one of the regular attendees approached me and commented that I had included "less philosophy" in my talk. So this year I decided to be heavier on QRP philosophy and lighter on my dubious simple electronics. This makes my written proceedings somewhat more difficult since including all my ramblings on the subject would thwart the impact of my presentation. So these notes offer a mere favour of my thoughts plus some little circuit ideas that have amused me over the last year.

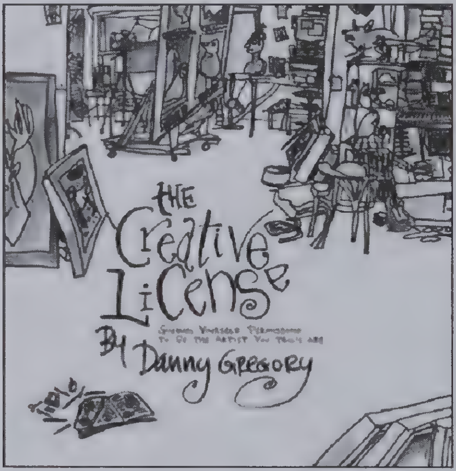
My wife and I have a modest property in Wales, set between the mountains and the Irish Sea, that we visit for peace and refreshment and to explore local Celtic sites. During my reading there, I have come to enjoy the work of the Welsh poet R. S. Thomas, a rather moody Welsh clergyman who died a few years ago. Perhaps my favourite poem is "The Bright Field" which says…

The Bright Field

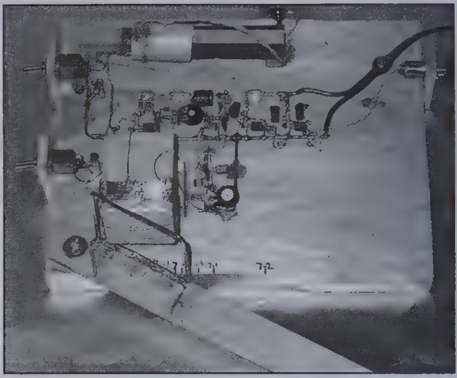
I have seen the sun break through
to illuminate a small field
for a while, and gone my way
and forgotten it. But that was the pearl
of great price, the one field that had
treasure in it. I realize now
that I must give all that I have
to possess it. Life is not hurrying
on to a receeding future, nor hankering after
an imagined past. It is the turning
aside like Moses to the miracle
of the lit bush, to a brightness
that seemed as transitory as your youth
once, but is the eternity that awaits you.
—R. S. Thomas

"Life is not hurrying on to a receeding future, nor hankering after an imagined past. It is the turning aside like Moses to the miracle of the lit bush" seems to sum up exactly why I do QRP. When he saw the burning bush, Moses said, "Now let me turn aside and see this great sight." The word he would have used for "turn aside" is the Hebrew "soor," which means to "put away" or "leave alone." Let me put away what I am doing and devote my attention to this.

The value of any real hobby is being able to turn aside from the usual pressures of life and concentrate on something different; something of choice, something that does not have to be done. We should value the "amateur" in our radio. "Amateur" of course comes from the French (from the Latin) *amator* meaning "Lover." Something done purely for the love of it. Thankfully, this can lead to quirky, unusual and creative approaches to a subject. Genuine creativity is in short supply these days.


the Creative License
Giving Yourself Permission to Be the Artist You Truly Are
By Danny Gregory

In his wonderful book *The Creative License: Giving Yourself Permission to Be the Artist You Truly Are,* Danny Gregory writes, "Through the history of our species, ordinary people have always made paintings, sung songs, decorated their homes, expressed themselves in a hundred ways. Today, however, we are increasingly creatures who expect others to provide us with entertainment and culture. We take for granted that creativity is the domain of professionals. We are convinced that if we cannot be perfect, we should not try."



PA7ZEE's simple receiver for 40 and 20m.

Geert Paulides, PA7ZEE, produced a delightfully novel and simple receiver for 40 and 20m with an interesting method of tuning. He decided that variable capacitors were expensive. Geert saw the Wayne McFee, NB6M, "Tin Ear Receiver" with permeability tuning; a brass screw forms a core moving in and out of the VFO coil. He attempted a version using a wooden stick with a single shorted turn moving towards the coil. Combined with a mixer and audio amplifier, his VFO formed the heart of a simple and unusual receiver.

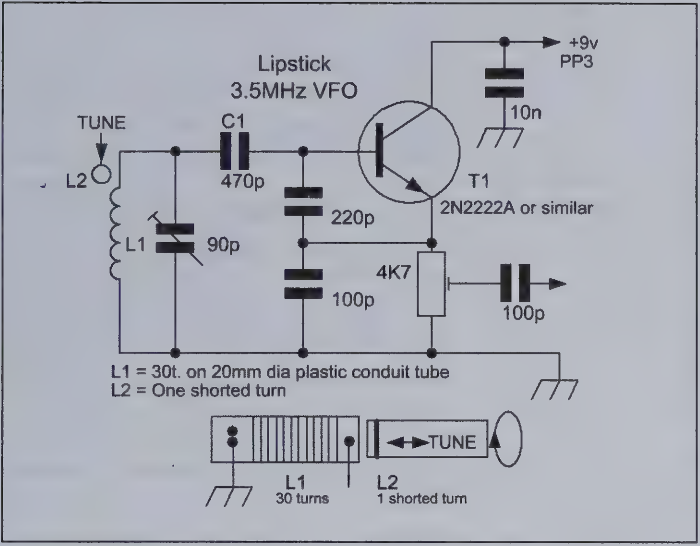
I like a novel idea, so I decided to try my own version of the PA7ZEE VFO.

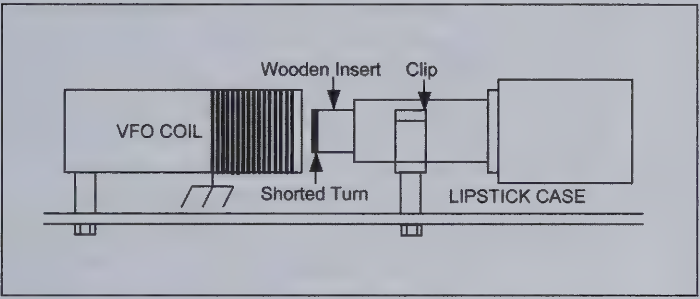
I called it the "Lipstick VFO" because in place of the wooden stick, I used the mechanism from one of my wife's discarded lipsticks to move the shorted turn in relation to the VFO coil. The lipstick gel is removed from the mechanism (a messy job involving a knife and lots of hot soapy water) and replaced with a piece of wooden dowel rod holding the shorted turn.

The circuit is a Colpitts Oscillator using capacitive feedback and a generic npn transistor. An evening of experimenting and a fair amount of compromise produced a surprisingly stable VFO at 3.5 MHz. The mechanics are simple using a coil wound on 20 mm electrical conduit tube (standard in the UK).

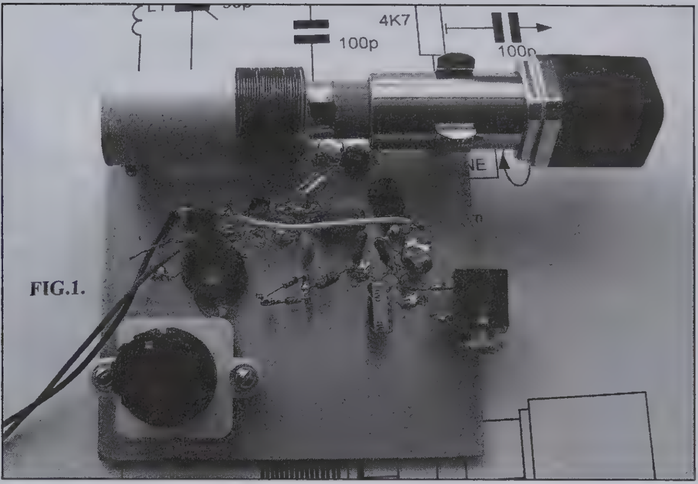
A spring tool clip holds the lipstick case in place, which is aligned with the coil using stand-off pillars. The diagram and picture on the following page show it well.

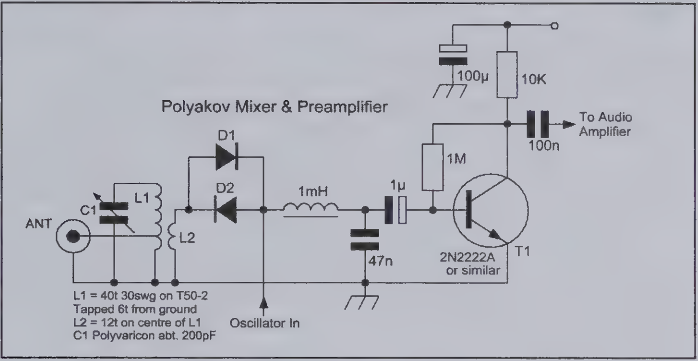
As a practical example, I made a simple 40m receiver using a Polyakov mixer.





Above: Diagrams for the "Lipstick VFO," showing how the variable inductor is constructed.





Top: Photo of the "Lipstick VFO." Bottom: Diagram of the 40m receiver using a Polyakov mixer.

This circuit, from RA3AAE, uses two diodes that function as a mixer and also as a doubler. The 3.5 MHz VFO is thus able to drive a 7-MHz receiver. A single tuned circuit pre-selector gives basic selectivity, and a single stage audio pre-amplifier enables enough drive for an audio amplifier. Not the most sophisticated receiver in the world, but it did receive a good range of European stations on 40m.

QRP Changes Time…

Time is an odd phenomenon; we see it as linear (past, present and future) but it can be circular. The Greeks had two ways of expressing time, *kairos* (pronounced ky-ros) and *kronos.* Clock time, the way we measure linear time in our "real" world, is *kronos* (chronology). *Kairos* time is the dimension of time we are absorbed into. While *kronos* is solely quantitative, *kairos* has a qualitative nature. We sometimes talk about "quality time," and that does not have a sequential nature. Whenever you engage in activities that nourish your soul, you are in *kairos* time. We participate in *kairos* time, rather than racing to catch up with it.

Kairos time may occur during shared time with a loved one, creative activities, reading a well-written book, listening to music or any activities that are personally meaningful to us. One is wholly absorbed in the moment, unhurried and unaware of time passing. We all know experiences when "time stands still." We are so absorbed by what we are doing that all sense of time is lost. QRP activities transport us into the realm of *kairos* time. When you switch on the radio, or switch on the soldering iron, chronological time is left behind.

Those Little Amplifiers…

The receiver described above requires the addition of an audio amplifier. Like many QRP constructors, I would probably turn to the LM386 or the LM380. You know the approach (see Figures 1 and 2 on the following page).

Recently, I was pointed towards another little amplifier chip that is available at very low cost—the TDA2822. The TDA2822 comes in the 8-pin DIL configuration, although there is a less common 16-pin DIL version. It is a dual amplifier designed for stereo applications that can be operated with a surprisingly wide supply voltage (1.8 to 9 volts). The total harmonic distortion is quoted at 0.5%. Power output is a little low, at about 0.65 watts in stereo operation and just over 1 watt if both amplifiers are used in a bridge circuit; Figures 3 and 4 are for a 6-volt supply. It has about 40 dB of gain in the bridge arrangement.

I have found it a useful, and expensive, headphone amplifier when used in the bridge arrangement in simple battery powered receivers.

I am indebted to Bill Mera, of "Soldersmoke" fame, for pointing me towards a deeply interesting paper called "Shop Class as Soulcraft" by Matthew B. Crawford. Crawford praises creative manual skill and the satisfaction it can yield. He writes:

"The satisfactions of manifesting oneself concretely in the world through manual competence have been known to make a man quiet and easy. They seem to relieve

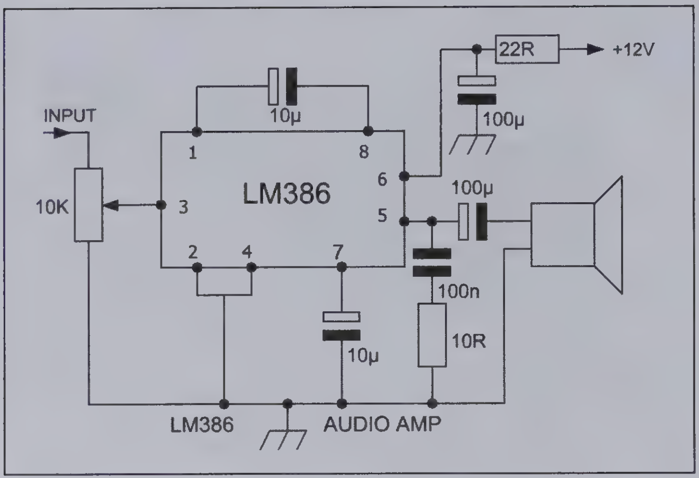


Figure 1.

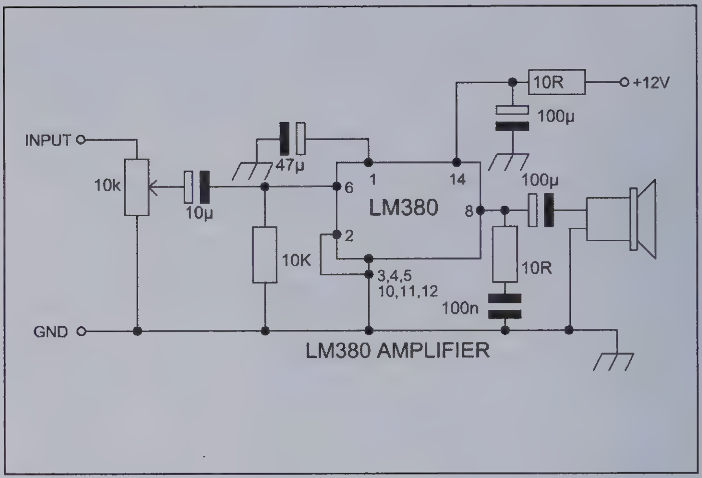


Figure 2.

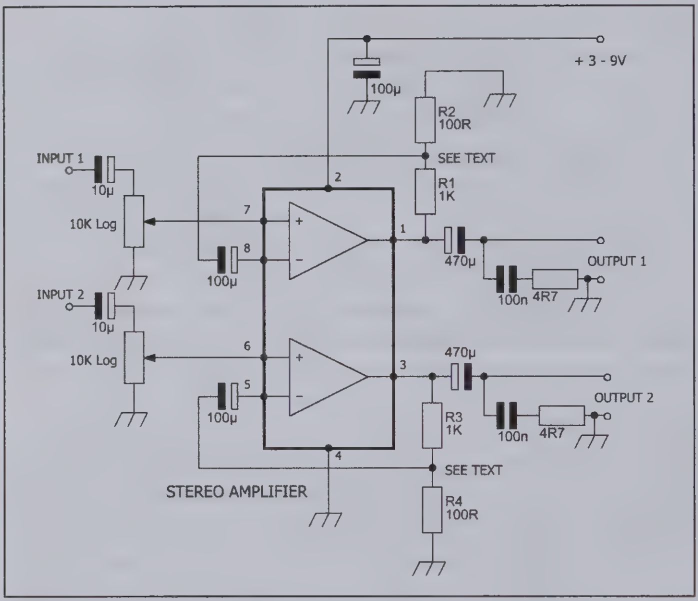


Figure 3.

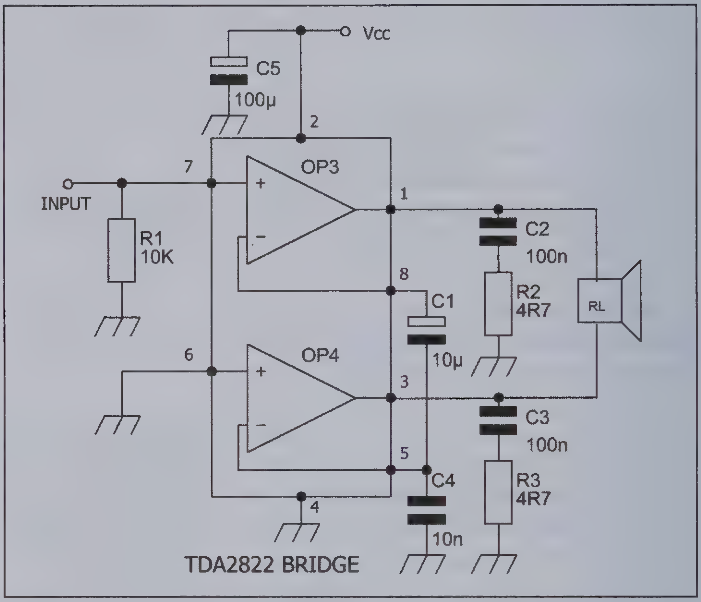


Figure 4.

him of the felt need to offer chattering interpretations of himself to vindicate his worth. He can simply point: the building stands … the car now runs … the lights are on.

So what advice should one give to a young person? By all means, go to college. In fact, approach college in the spirit of craftsmanship, going deep into liberal arts and sciences. In the summers, learn a manual trade. You're likely to be less damaged, and quite possibly better paid, as an independent tradesman than as a cubicle-dwelling tender of information systems" (Matthew B. Crawford, "Shop Class as Soulcraft," *The New Atlantis,* No. 13, Summer 2006, pp. 7-24).

Craftsmanship

The thing that is handmade by a craftsman has no desire to last thousands upon thousands of years, nor is it possessed by a frantic desire, like mass-produced objects, to meet an early end. It follows the round of days; it drifts along as the current carries us along together. It wears away little by little; it neither seeks its end nor denies it: It accepts it. Between the timeless time of the museum and the speeded up time of technology, craftsmanship is at the heartbeat of human time. A thing that is handmade is a useful object but also one that is beautiful. An object that lasts for a long time but also one that slowly ages away and is resigned to so doing. An object that is not unique like a work of fine art, it can be replaced by another object that is similar but never the same. The craftsman's handiwork teaches us to live and hence to die.

From "In Praise of Hands" by Octavio Paz:

Things Men Have Made
Things that have been made
with weakened hands,
and put soft life into,
are awake through years
of transferred touch,
and go on glowing for long years.
For this reason,
some old things are lovely,
warm still with the life
of forgotten men who made them.
—D.H. Lawrence

Mr. Hartley's Oscillator

I guess that most radio builders have their favourite oscillator of choice. Mine is probably the Colpitts. Variants of it have worked well for me over the years. Recently I have been doing a little soldering iron doodling with Hartley oscillators. I think I have underestimated their worthiness in the past.

The Hartley oscillator was conceived by Ralph V. L. Hartley when working for the Western Electric Company in 1915. The difference between the Colpitts and Hartley oscillator is illustrated in Figure 5. Each oscillator has an amplifier, a tuned circuit and a divider network to feed some of the output signal back to the input to maintain oscillation. The Colpitts oscillator (a) uses a capacitive divider network for the feedback, the amount of feedback determined by the capacitance ratio of the two capacitors. The frequency is controlled by the tuned circuit (C1 and L1). The Hartley oscillator (b) uses inductive feedback. C1 and L2 form the tuned circuit and L2 uses a tap, a connection near the bottom of the inductor, to introduce the feedback to the input. The amount of feedback is determined by the position of the tap.

I decided to try a Hartley oscillator for the 7 MHz band. The circuit in Figure 6 roughly follows the design criteria in that fine book *Experimental Methods in RF Design,* by Wes Hayward, W7ZOI, and others. The frequency determining components are to the left of the circuit isolated by the 3.3 pF series capacitor. The inductor is 27 turns of 24 s.w.g. enameled copper wire wound on a T50-6 core. The winding is tapped 7 turns from the ground end of the winding. The capacitors in the tuned circuit are made up of the main tuning capacitor (25 pF), a trimmer capacitor (40 pF) and a parallel padding capacitor (Cx). The value of Cx is determined by experimentation with the trimmer capacitor available for fine adjustment. I used NPO capacitors to make up the value of Cx. A useful tip is to use several capacitors to achieve the desired frequency. Several smaller value capacitors will be more temperature stable than one larger capacitor. I found that two 390 pF capacitors brought me close enough to the band for the trimmer to achieve 7 MHz when the tuning capacitor was fully meshed. The result was a VFO with good stability and desire to try Hartley oscillators more often.

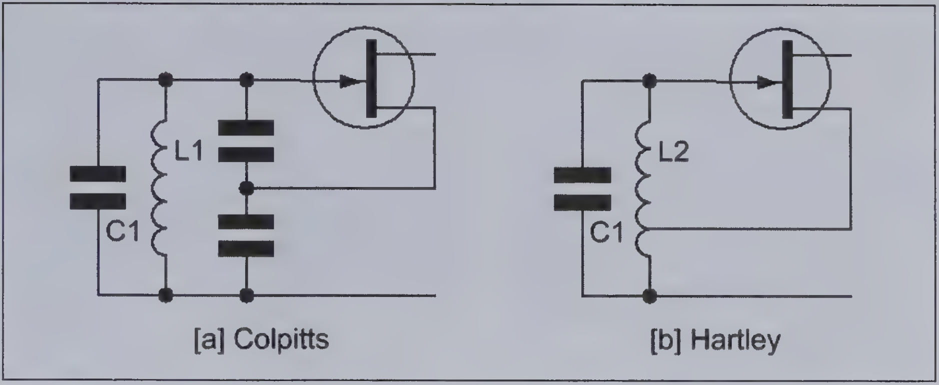


Figure 5.

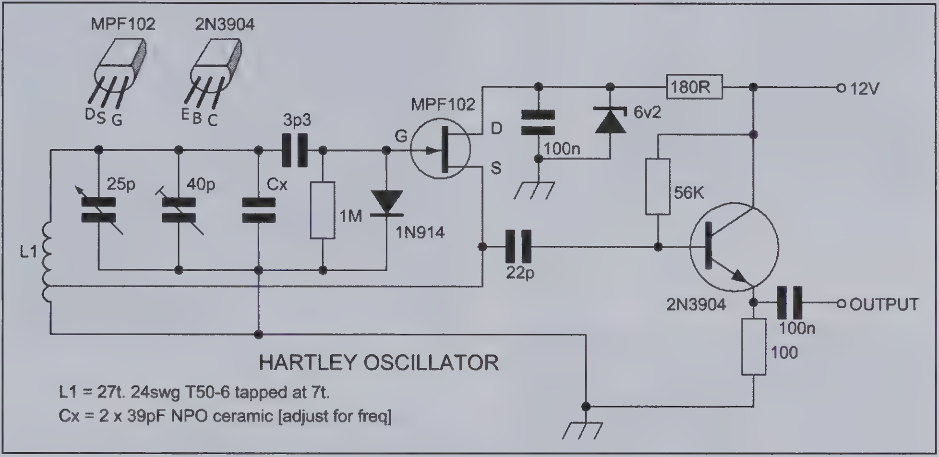


Figure 6.

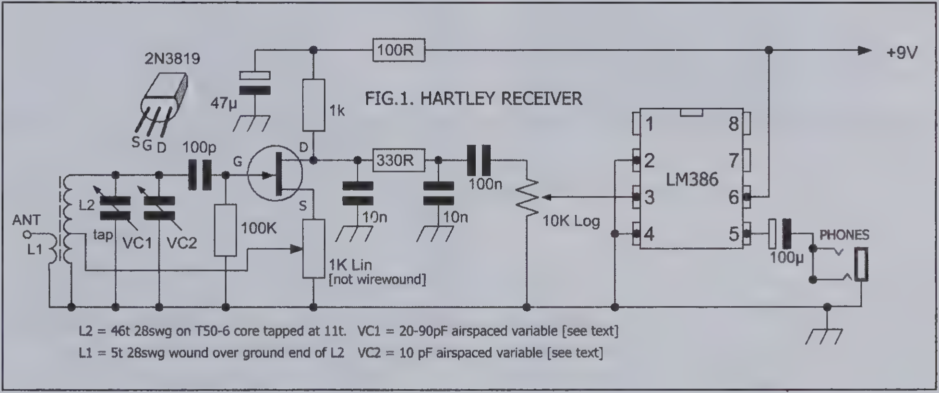

2N3819
S G D
47µ
1k
100R
+9V
FIG.1. HARTLEY RECEIVER
100p
G
D
S
330R
100n
10n
10n
10K Log
LM386
1
2
3
4
5
6
7
8
ANT
L1
L2
tap
VC1
VC2
100K
1K Lin
[not wirewound]
100µ
PHONES
L2 = 46t 28swg on T50-6 core tapped at 11t. VC1 = 20-90pF airspaced variable [see text]
L1 = 5t 28swg wound over ground end of L2 VC2 = 10 pF airspaced variable [see text]

Figure 7.

The Hartley Oscillator can also form the heart of a simple regenerative receiver. The example shown in Figure 7 is a version of a receiver by Tony Fishpool, G4WIF. Tony's design is called "The Two Dollar Regen" and was an entry in a regenerative receiver building contest at HamCom 1999 in Arlington, Texas. VC1 has capacitive range of about 15 to 90 pF. VC2 is a smaller value variable capacitor used as fine tuning control. I found one with only three vanes and roughly a 10 pF capacitive range.

Another version of the Hartley receiver (Fig. 8) is a one-FET, multi-band, multi-mode receiver! The tuned circuit uses C1 and C2. C1 is the FM section of a polyvaricon variable capacitor of the type used in the older AM/FM. radios. The one I used has an FM section with a capacitive range of some 5 to 25 pF. C2 is a parallel capacitor to bring the tuned circuit into the desired tuning range. I arranged for C2 to be a plug-in component, so that by changing the value, different tuning ranges can be achieved. I found I could hit the 7 MHz band by using 120 pF, the 10.1 MHz band by using 68 pF and the 14 MHz band by using 22 pF. So it really is a multi-band receiver! C2 should be a ceramic NPO-type capacitor to eliminate frequency drift. The output load for the MPF102 is an audio transformer used to drive headphones. In practice the audio output is very low, so unless the listener only wants to listen to broadcast stations, I suggest the output is connected to an external audio amplifier.

So… A few thoughts and a few little circuit ideas to try.

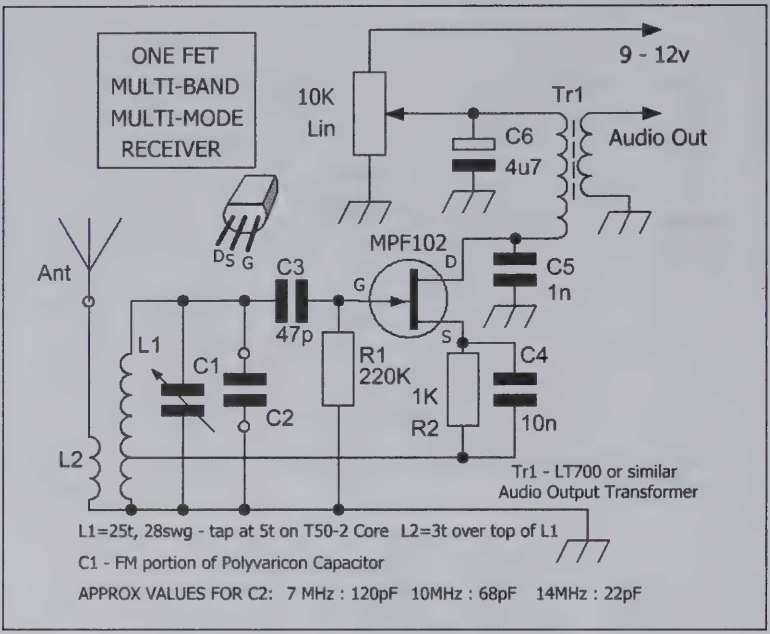

ONE FET
MULTI-BAND
MULTI-MODE
RECEIVER
9 - 12v
10K
Lin
Tr1
C6
4u7
Audio Out
D S G
MPF102
D
G
S
Ant
C3
47p
C5
1n
L1
C1
C2
R1
220K
1K
R2
C4
10n
L2
Tr1 - LT700 or similar
Audio Output Transformer
L1=25t, 28swg - tap at 5t on T50-2 Core L2=3t over top of L1
C1 - FM portion of Polyvaricon Capacitor
APPROX VALUES FOR C2: 7 MHz : 120pF 10MHz : 68pF 14MHz : 22pF

Figure 8.

Small Joys

"My advice to the person suffering from of lack of time and from apathy is this: Seek out each day as many as possible of the small joys, and thriftily save up the larger, more demanding pleasures for holidays and appropriate hours. It is the small joys first of all that are granted us for recreation, for daily relief and disburdenment, not the great ones."

—Herman Hesse

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You can find the Toy Store at — www.qrparci.org

Past FDIM Proceedings are also available, as well as CD collections of past QRP Quarterly articles!

QRP Clubhouse

Timothy A. Stabler—WB9NLZ

wb9nlz@yahoo.com

Hello to everyone. As I write this in early June, I know Field Day is coming up, and I would like to hear from any group on what you did for that event, or anything else you might have going. Please put "club doings" in the subject line, so I do not inadvertently delete it. I may have deleted some mention of a club activity in a club email (as I am in several); I have deleted much stuff due to the fact that my wife and I are starting to get a house built, and if you have done that, you know the delays. Right now we are four weeks behind the simple act of groundbreaking.

Ozarkcon 2008

This is the only event that I have attended since my last column. Atlanticon was canceled this year due to various problems. However, Ozarkcon was held. For those of us in the Midwest and several from either coast, this has become an event not to miss. The fellowship is great. The talks are very good and understood by everyone regardless of background. And everyone has a great time.

At 4 PM, Friday afternoon, registration started. The registration desk was run by Wanda Porter, XYL of Joe Porter, WØMQY. Wanda does this each year to help out. The banquet began at 6:30, and as usual, the food was delicious and the fellowship wonderful. At the end of the banquet, the room was emptied so things could be rearranged for the vendors to set up their wares.

Also, following the banquet was a kit-building session. This was run by Joe Eisenberg, KØNEB. Like the banquet, participation in this event must be arranged when registering. For the kit building, two sessions were needed to accommodate everyone. Everyone who attended was given a Simple Keyer Chip Keyer Kit furnished by Doug Hendricks, KI6DS. Tables were set up with electrical outlets for soldering irons and lights, if desired. Myself, I used a 36 LED lamp I had purchased at Menard's for my light source. It did provide a nice light for my building to proceed at a good pace.

After the second kit-building session, the music began with four guitars, two banjos, a fiddle, a penny whistle, a bass and two mandolins. The musicians included Jim and Kathy Kortge, K8IQY and KB8IMP; Cy Currier, K1TES; Doug Hendricks, KI6DS; Keith Newman, K5YCM; Graham Firth, G3MFJ; Debbie Harper; Keith Price, WA5LPW; Tim Stabler, WB9NLZ; Nick Kennedy, WA5BDU; and Chuck and Mary Lou Foley, W5CJF and XYL. This was the largest group to play at any Ozarkcon. We kept playing until quite late.

Figure 1—The banquet begins.

Figure 3—Pickin' and grinnin' after the banquet.

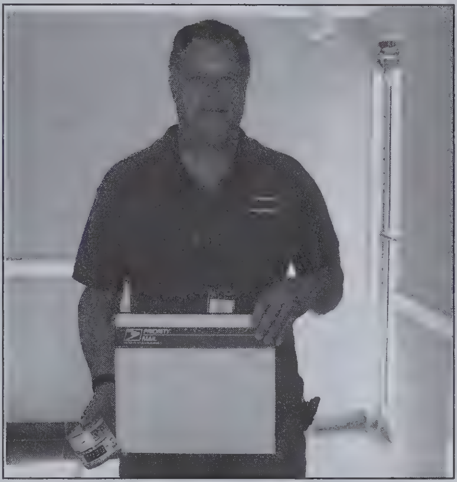


Figure 1—Winner! (Bob, W7KU)

The next morning, the talks began as Doug Hendricks, KI6DS, gave the opening remarks and welcomed everyone to the meeting. The first order of business was the presentation by Jay Bromley, W5JAY, of the ARCI Hall of Fame plaque to Jim Duffy, KK6MC. Jim received a standing ovation. Then Doug talked about his newly designed transceiver, the PRF-3, which he will be offering as a kit in the near future. This was passed around for everyone to look at. Rex Harper, W1REX, was the first speaker and spoke to us about picaxe applications and programming. Rex showed some specific applications of it using his hatchet board. Everyone was given a hatchet board, and we were informed he had a bag of parts for the board for sale at his vendor site. I was someone who had never really looked at the Picaxe for doing anything, but I am now

Figure 2—Kit building.

Figure 4—Jim Duffy, KK6MC, (l) receives his Hall of Fame Award from Jay Bromley, W5JAY.

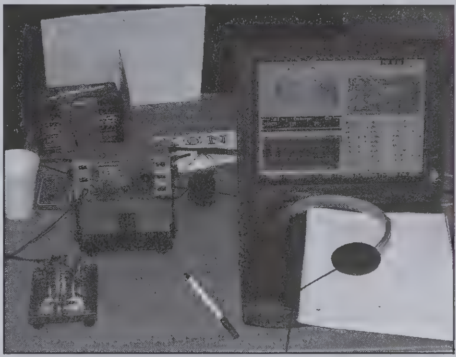


Figure 6—The event station in the dummy load contest.

convinced that it has a place in my construction projects. Following Rex was Tommy Henderson, WD5AGO, who spoke on microwave and QRP moon bounce. He described homebrew and surplus dishes, large and small and CCR compliant dishes he has built or modified and used. He also overviewed power levels required for successful moonbounce on various frequencies and cost of various options.

Following lunch, the next speaker was Nick Kennedy, WA5BDU, who spoke on crystal characterization and filter design. This was a very good talk and makes one appreciate even more the guys designing various QRP rigs. The next speaker was Steve Yates, AA5TB, who covered ELF and VLF radio. He does a lot of listening in the zero to 30 kHz range. He played various sounds he has recorded and described their probable causes, most being natural phenomena. The last talk was on test equipment for the QRPers by Graham Firth, G3MFJ. He described various equipment now used and some promised test equipment gadgets. These were clever and passed around so we could appreciate Graham's construction techniques in building circuits in a variety of candy tins. Jim Kortge was also called upon to talk about his 2N2222 transceiver that is to be offered as a kit later this year by NorCal. This was also passed around to be looked at.

At the end of the meeting Graham Firth, G3MFJ, was awarded with the QRP Operator of the Year. The Grand Prize, a 5-band Wilderness Sierra, was won by Bob Kimball, W7KU. As you can see from the photo, Bob also has two of the "Tuna Tin" kits by Rex, W1REX. After dinner, a second music session got into swing.

Like last year, the club operated a dummy load station that people in their rooms tried to contact using only a dummy load on their rigs. This proved to be a lot of fun for everyone who participated.

On Saturday, there was also a wacky key contest in which one could enter anything, but the key had to actually be able to send code.

That's it for now. Please send me what your group is doing or planning to do.

—72, Tim, WB9NLZ

●●

VHF QRP: My QRP Rig is an HT

Bob Witte—K0NR

bob@k0nr.com

What is the most popular type of QRP rig of all time? Easy answer: The handheld FM VHF transceiver, commonly known as an "HT." OK, I really don't have any reliable data to back this up, but just look around at your local hamfest and radio club meetings. There are lots of hams walking around with HTs, arguably many more than own traditional HF QRP rigs.

So is an HT really a QRP rig? Of course, since it puts out 5 watts or less! That is the fundamental definition of QRP: low power… and 5 watts is the generally accepted limit. Is 5 watts too high for you? No problem, most HTs have a low power setting that will take it down the 100 mW level or even lower.

Definition of QRP

Maybe we need to use a more robust definition of QRP, beyond just the power level. To me, the definition of QRP is:

- Low RF power level (< 5 watts)
- Easily portable, battery-powered operation
- Efficient operating (operator skill, efficient modes like CW, maximizing every dB)
- Often operating in the great outdoors

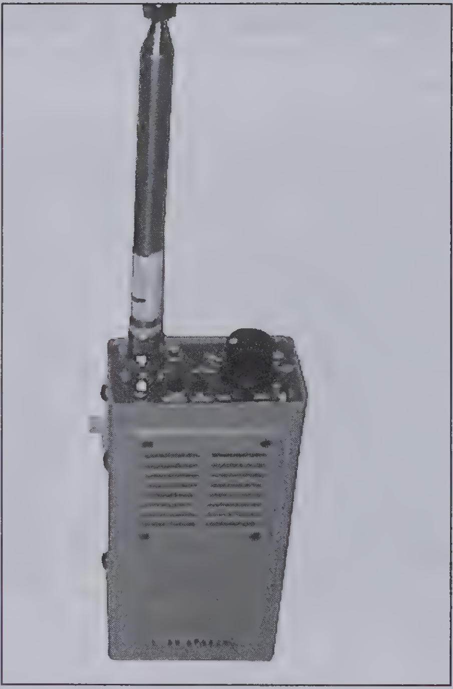


Figure 1—Mizuho manufactured this 2M SSB/CW transceiver in a handheld form factor. (Photo courtesy of rigpix.com)

With this more complete definition of QRP, how does the FM HT stack up? No problem on the RF power level. Clearly, an HT is easily portable and battery powered… toss it in the backpack or hook it on your belt, and you are ready to go. Efficient operating… um, well, let's skip that one for right now. Often operating in the great outdoors? Yes. An HT is great for taking on a hike in the woods.

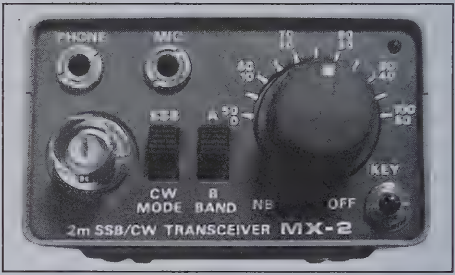


Figure 2—The top view of the Mizuho MX-2 transceiver. (Photo courtesy of rigpix.com)

What About Efficiency?

Back to the issue of efficiency…that seems to be the one that we choke on. Is an FM HT efficient? Doesn't seem like it, as much of the operating depends on repeaters, also known as The Box on the Hill. Sure, the HT is low power, but it gets its range from that big transmitter at the repeater site, running 50W output power.

Of course, HTs can be used on simplex and do quite well from the right Height Above Average Terrain (HAAT). With the right band opening, an HT can transmit for a long distance. One key issue is to discard the "rubber duck" antenna in favor of something that actually radiates. The standard antennas are optimized for size but not for efficiency. One of the 1/2-wave telescopic antennas with BNC or SMA connectors are a much better choice. Even better is a small yagi antenna, fed by a short length of coaxial cable.

The real weak spot of the HT is its use of Frequency Modulation (FM). FM is wonderful when signals are strong but degrades quickly when the signal level falls off. It is difficult to think of FM as "efficient." There have been attempts to put SSB and CW into the HT form factor. Most notable are the Mizuho and Nishi Musen lines of radios, which offered a variety of SSB/CW handheld radios for the HF and VHF bands. (For more detail on these rigs, see the Mizuho radio web site listed below.) These radios had a good idea embedded in them… handheld format combined with the efficiency of SSB and, yes, CW. Of course, it is a little difficult to imagine walking around with an HT in your hand while clicking away on a straight key. While these radios had something to offer, they didn't include FM at a time when that mode was dominating the VHF world. They never really caught on and are no longer in production.

The closest thing we have to an SSB/CW handheld transceiver for VHF and higher is the FT-817 from Yaesu. While not a handheld radio, it is the most portable form of a multimode VHF QRP radio on the market today. And they even include the HF bands for free.

The Modern-Day Handheld Transceiver

In case you haven't been keeping track, the modern VHF FM handheld transceiver has a long list of features included in it. Most of these features extend the receiver capability of the radio. Most common is wide coverage receive of FM signals. For example, on the 2-meter band (144-148 MHz), an HT might receive frequencies in the range of 136-174 MHz, which includes the NOAA weather stations in the 162 MHz range. Many of these HTs cover the aircraft band, which requires AM receive on 118 to 137 MHz. Another common feature is to include receive of AM broadcast stations (520 to 1610 kHz) and FM broadcast stations (87.8 to 108 MHz). Broadcast FM has a higher deviation than typical amateur FM, so a wideband receive mode is included.

Figure 3—The Kenwood TH-F6A transceiver can receive frequencies from 0.01 to 1300 MHz, including FM, AM, SSB and CW modes. (Photo courtesy of rigpix.com)

Some transceivers have taken "extended receive" down into the high frequency spectrum (below 30 MHz), enabling the reception of AM shortwave broadcast stations. Kenwood claims that its TH-F6A handheld (Figure 3) has the widest receiver in the industry at 0.01 to 1300 MHz. This radio also includes the unique capability of CW and SSB receive (but not transmit).

This makes me wonder if basic CW transmit capability could be added into this kind of rig. Given some of the innovative QRP rig designs that are available, it doesn't seem all that far fetched to have a CW transmitter in an HT. Actually, just keying the FM transmitter without any modulation produces a CW signal. However, most HTs shift in frequency when they first transmit, which produces a nasty chirp on CW. Some careful attention to transmitter keying should be able to overcome that issue.

It is probably more a question of market demand… otherwise known as "does anyone care about this mix of features in an HT?" Lots of things are technically possible but not all of them make it to market. Well, until that happens we'll have to be satisfied with FM-only transmit.

FM VHF Portable

I realize that I may not have convinced all of you (or any of you) that an FM HT is a useful QRP rig. Let me make one more run at it by painting a mental picture for you. (Please turn your imagination to maximum power!)

You are camping out in the woods or on the beach with your favorite "real" QRP rig, working 20 meter CW late into the evening. (This alone may test your imagination given recent band conditions.) You finally get bored with working the pileup of stations that are all calling you, and the propagation fades. Fortunately, you brought along your trusty FM VHF handheld radio. First, you flip over to the local NOAA weather station on 162.55 MHz and listen to current and predicted weather conditions for your area. The forecast looks great, so no problem there. Then you tune to the local AM station and check the final score of your favorite baseball team. Finally, you decide to listen to the BBC world news on the shortwave bands. Then you go to sleep.

The next day, after breakfast, you head out for a hike to the top of a nearby hill. At the summit, you get out the HT, attach a 1/2-wave 2-meter antenna to it and give a call on 146.52 MHz (the FM calling frequency). Again, you are treated to a pileup of stations all eager to work you. Well, maybe not quite a pileup in the HF sense. It is actually more like 3 or 4 local hams that are monitoring the frequency. Two of them are camping nearby, one is operating from home, and the last one is mobile on the way to Grandma's house for the weekend.

On the way back to camp, you come across an injured hiker that is unable to hike out. Out of cellphone range, you call one of the hams on 146.52 MHz and have them relay a request for assistance to the local sheriff's office. An hour later, a search and rescue team shows up to evacuate the hiker.

An FM VHF handheld is a versatile QRP radio that fits in your backpack or coat pocket. Take one along the next time you are out and about.

Drop me an email with your thoughts or stop by my blog at www.k0nr.com/blog

—72, Bob KØNR

References

"VHF QRP: Give It a Try," Bob Witte KØNR, http://www.k0nr.com/vhfqrp.html

"QRP Philosophy," Rich Arland, K7SZ, http://www.arrl.org/tis/info/pdf/0210081.pdf

Mizuho radio web site, http://www.mizuhoradio.com ●●

Balanced Line Tuner (BLT) Mods

Carey Fuller—KX0R kx0r@arrl.net

Editor's note: The Balanced Line Tuner described in this article refers to the Norcal BLT offered as a kit from Hendricks QRP Kits. QRP Quarterly *has shared this information with Doug Hendicks prior to publication.*

Section I—KX0R's BLT Mods—General

Here are some of the modifications you can do to extend the frequency range of your BLT. Refer to the schematic in Figure 1. Several photos of modified BLTs are provided at the end of Section II.

1. Increase or decrease the number of turns on the main inductor.
2. Change the capacitance of the variable capacitors.
3. Change the core material.
4. Put taps on the main inductor to add a high-frequency range.
5. Change the configuration—use a different circuit.

I've done all of these things, so next I'll expand on each idea above with what I've learned.

1) There's nothing sacred about the main inductor/transformer (L1, L2, L3) in the BLT. If you wind it by the manual, you'll get good performance on several ham bands, probably 40, 30, and 20 meters, maybe 17, depending on your antenna and feedline.

If you add turns to L1, you'll lower the frequency of operation. Doubling the number of turns for L1 will multiply the inductance by about 4, which will make the frequency about half what it was previously, if the capacitors are left the same. There are a couple of key points if you change L1:

1. If you increase L1's turns, you may want to increase the turns on secondary windings L2 and L3. L2 and L3 should increase roughly in proportion to L1. So if you double the turns on L1, you may want to double L2 and L3 as well. There's nothing critical about any of this—L2 and L3 determine the impedance ratio of the transformer; you may want to change either or both, depending on the load you want to match.
2. If you increase L1 very much, like to get down to 160 meters, you'll need to use a smaller wire gauge. L1 should be a single flat winding if possible—not overlapped over itself.
3. L2 and L3 can be wound between the turns of L1, or over the top of L1. L2 and L3 can be separate windings, as in the manual, or L3 can be taps on L2.
4. Symmetry should be maintained—all three windings should be balanced with respect to the ground tap on L1. If you add or remove turns at one end, do the same at the other end of the winding. The number of turns on L1 should be the same on each side of the ground tap.

2) If you increase or decrease the capacitance of the variable capacitors, you can tune to lower or higher frequencies, as well as match a wider range of impedances.

1. C3 is the main tuning cap. C3 must be multiplied by about 4 to move the frequency down to half what it was previously, assuming that L1 is unchanged.
2. C2 is the input cap, and it affects both frequency and impedance. You may need to increase C2 if you can't match a low impedance near the low frequency tuning limit.
3. C2 and C3 can be increased by substituting larger polyvaricons. These are no longer in production, so they're hard to find. I found some units totaling about 546 pf, and these work well for the 160 and 80 meter bands.
4. Small switches and capacitors can be added to increase the capacitance of C2 and C3. I used SPDT/CENTER OFF mini toggle switches because they offer three values of capacitance: position 1, position 2, and none. They'll fit below or above C2 and C3 if you're careful. Micro toggle switches are OK also.
5. I used dipped mica caps to increase C2 and C3. These are good because they have high Q and are rated for several hundred volts. Even with QRP, C2 and C3 may see RF voltages well above 100V.
6. I found that at high frequencies, like above 18 MHz, the tuning of C3 was sometimes near minimum capacitance and critical. On some of my tuners I added a switch to select just the 60 pf section of the dual-section polyvaricon. This reduces the minimum capacitance slightly, and it makes the tuning easier to adjust on the higher bands.

3) The stock BLT uses a T106-2 core. This material has a permeability of 10, which is ideal for the lower bands. For higher frequencies some other toroid cores and materials are better.

1. The T106-6 core is the same size as the T106-2, but the permeability is 8.5; the T106-6 core has lower loss at higher frequencies than the T106-2. If you use a T106-6, you'll need more turns of wire for the same frequency as the T106-2; but you'll also be able to hit higher frequencies with the same number of turns and similar capacitance.
2. I recommend the T106-6 core if you're interested in customizing a BLT for 20, 17, 15, 12, and/or 10 meters.
3. Other powdered iron cores may work fine. For example, a T80-6 should work OK for the upper HF bands. There's nothing critical about these cores at QRP levels. You'll have to experiment or calculate to determine how many turns you need.
4. I built a BLT that covers 15,12,10, and 6 meters. The core is a T80-10; type 10 material has a permeability of 6. L1 has 6 turns. L2 has 4 turns, and it's tapped for 2 turns for L3.
5. I doubt that most ferrite cores would be suitable, since we need a high-Q tuned circuit.

4) If you add a pair of taps to L1, you can create a high frequency range on any BLT.

1. The taps are placed symmetrically on each side of L1. If you have 8 turns on each side of L1 (16 turns total), you might put your taps at 5 turns each side of the ground tap (3 turns from each end).
2. You can add a tap by scratching the magnet wire's insulation with an Xacto knife, tinning the copper, and soldering a piece of wire to the tap.
3. You'll need to add a DPDT mini toggle switch in the center of the BLT's front panel, right above the TUNE/OPERATE switch SW1. The new switch is wired to select either the ends of L1 or the new taps.
4. The LED is moved over on the panel above C2.
5. The closer the taps are to the ground tap of L1, the higher in frequency you can tune.
6. The turns ratios of L1 to L2 and L3 with the new taps aren't the same as with the entire winding of L1, but good matches may be obtained anyhow.
7. If your new taps are too close to the ground tap of L1, you won't have the right ratios to match low impedances easily, because you still have the original number of turns on secondaries L2 and L3. You can play around with the turns on L3 and find a compromise that works for the bands and loads you want to work with; 4T on L3 might work OK on both ranges.

5) Other circuits can be used to change how the BLT operates.

1. The stock BLT is a relatively balanced design, with the tap on L1 at its center. This is not really a true Z-match, but it works well over a somewhat limited range of frequencies.
2. The real Z-match is a double-tuned circuit; it usually employs a 2-section variable capacitor to achieve two modes of resonance using a tap on the coil/transformer.
3. I built a "BLT" based on the original Z-match. I used dual 273pf polyvaricons in the double-tuned circuit.
4. My Z-match BLT will match loads from below 1.8 to above 30 MHz…but…
5. The Z-match suffers from poor balance on the higher frequencies, due to stray capacitance and a lack of symmetry. It will tend to match in common mode rather than balanced mode when used with some high-Z loads at the higher frequencies. The result is poor balance on the transmission line.
6. The Z-match is a bad choice for matching difficult high-Z loads, running a 40M dipole on 20M, etc.
7. The Z-match might be a good choice if you want to use it mostly on the lower bands, or with low-Z or unbalanced loads.
8. There are many variables in the Z-match, like where the taps are on the coil, how the capacitors are configured, etc.
9. If you like to experiment with tuners, the Z-match is an amazing circuit.
10. The BLT could be built with the original circuit, but with a link or separate winding (L4) for the input. C2 could connect from the bottom of the link to ground. This circuit would resemble the balanced tuners used decades ago.
11. Many other circuits that will work are possible. The BLT is a great starting point.

Here are a few common-sense tips that will help you get the most out of any modifications you try:

1. Use convenient hook-up wire for adding any parts, taps, switches, etc. Teflon is ideal because it's low loss, and the insulation doesn't melt. #26 and #28 are easy to work with.

2. Make wire connections short. Keep everything neat.

3. Be careful soldering to the polyvaricons. They don't like excess heat. Some mini-toggle switches can't take much heat either.

4. As you add more parts, it's hard to avoid conflicts. Try not to run RF wires alongside each other—maintain separation to reduce stray coupling.

5. Be sure that you don't create a "shorted turn" by the method you use to mount the large toroid for L1/L2/L3. A metal screw through the center is OK, along as it connects to nothing going back around to the chassis.

6. Make sure any switches you add don't short to the polyvaricons.

7. With care you can add many parts to extend the performance of your BLT.

8. As you add parts, you may need to label controls, so you can remember what the switches do, which range is which, etc.

It's easier to build a whole BLT for a different frequency range than to make all the mods to extend one unit to numerous bands. Consider building at least one BLT for the middle bands, another for the low bands, and maybe a third one for the upper HF bands.

If you try to force the unit to operate far outside its design range, losses will increase, and performance may suffer. It's easier and better to make a new BLT for 160M and 80M than to modify the stock unit to go down that far by adding capacitors, etc. The addition of a pair of upper range taps (see above) is a good mod. Adding switches for extra capacitance for C2 and C3 may be just what you need to match a lower band. Remember that adding too many variables will make it harder to find a good match.

Don't expect to make a BLT that covers 160 through 10 meters, with great efficiency and balance over the whole range, while matching everything from 1 ohm to 10K, resistive and reactive. It isn't going to happen. Remember that this gadget is a converter of complex numbers, and while it covers a big range of frequencies and impedances, the math limits what can be done with any set of components.

The SWR bridge in the BLT is good over a very wide frequency range. You can substitute 100 ohm 1W or 2W metal oxide resistors (MO) to make it a little more rugged, and the accuracy will be fine. The bridge I use at 50 MHz uses the 1W MO resistors.

The mod in the manual to add a switch and BNC output for unbalanced operation is a "must have" mod. You need this if you use coax on the output, run a vertical, hook up a dummy load, etc.

A good tool for working on BLTs is an antenna analyzer, such as the MFJ-259B. With a set of small resistors, you can verify the range of frequencies and loads you can match, without having to use a transmitter. Be sure to set your BLT into "Operate" mode when using your analyzer

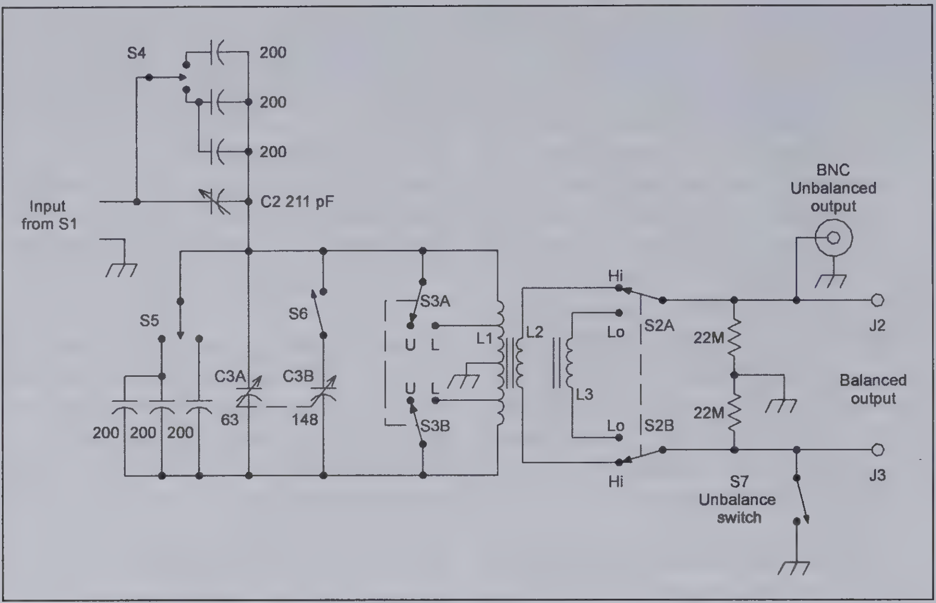


Diagram of the Balanced Line Tuner.

to test matches.

I've made many measurements on my BLTs. Without getting into details, the losses are generally low when you're matching resistive loads with reasonable impedances. Losses increase when you feed very low and very high impedances, or highly reactive loads, especially with both in combination. When you're in the field, the thing to watch for is sharp, critical tuning—this indicates a bad combination of resistance and reactance, or a less-than-ideal configuration of the settings on the tuner.

Experiment with your BLT(s), and don't hesitate to make changes when you can see a way to reach a particular goal. This is a great matching device, and it will let you do amazing things with low power and real antennas.

Section II—KX0R's BLT Mods—Schematic Notes and Toroid Data

The Tune-Operate switch, S1, and the Dan Tayloe LED bridge, are not shown in my drawing; please see the original drawing on P12 of the BLT Manual for details.

C2 and C3 are polyvaricon capacitors, each with a 63 pf variable section, a 148 pf variable section, and adjustable padders; set padders to minimum capacitance.

C2—Input capacitor—shown with both sections in parallel, for a total maximum capacitance of 211 pF

C3—Tune capacitor—shown with sections separate—S6 allows using C3A alone, for 63 pF maximum capacitance

S1—DPDT, not shown—Tune/Operate - unmodified

S2—DPDT—selects LOW Z or HIGH Z winding (or taps) on transformer

S3—DPDT—selects LOWER or UPPER frequency range—taps on L1

S4—SPDT, center off—adds capacitance to C2 for use on lower frequencies

S5—SPDT, center off—adds capacitance to C3 for use on lower frequencies

S6—SPST—disconnects C3B so only the 63pf variable section is used for tuning—allows easier tuning at higher frequencies

S7—SPST—connects one side of output to case for unbalanced operation, such as when feeding coax

L1, L2, L3—windings on toroid transformer—see data for suggested choices.

200 pF capacitors are CM04 (CD10) 500V dipped silver-mica.

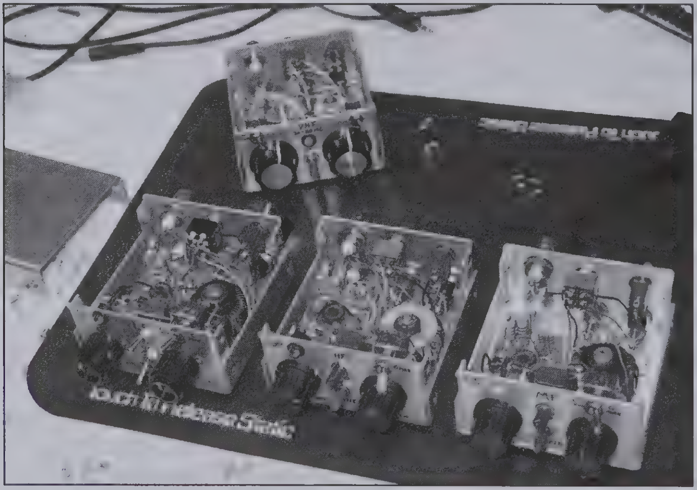
Switches are mini or micro-toggle types.

The LED indicator is moved to upper-left side of the front panel to make room for the frequency range switch, which goes in the hole previously used for the LED.

Suggested winding data for L1, L2, L3:

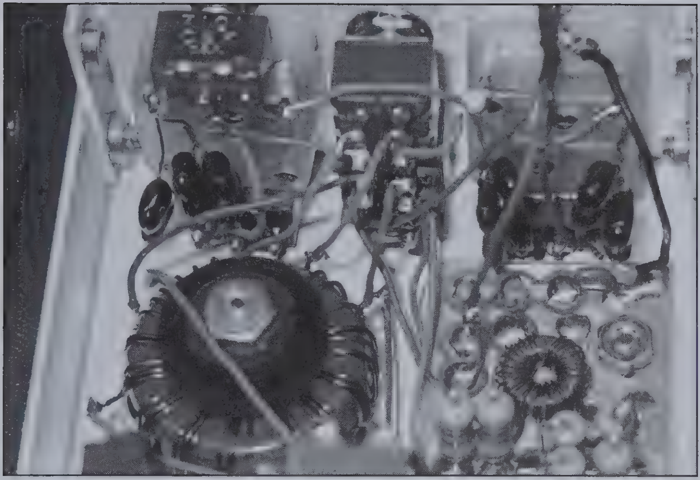
MF (original) version (4-25 MHz):

L1: 16T #22 or #22 on T106-2 (red) core, center-tapped at 8T to case L1 upper-range taps: 3 turns from ends of L1 (5T from center tap)
L2: 12T centered around tap on L1
L3: 6T centered around tap on L1

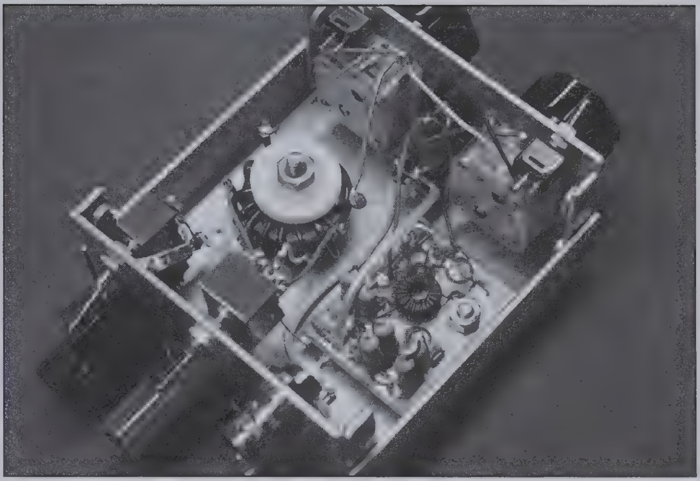


Tuners for 4 ranges.

LF version.



MF version.



VHF version.

HF version (5-30 MHz):

L1: 12T #22 or #20 on T106-6 (yellow) core, center-tapped at 6T to case L1 upper-range taps: 2 turns from ends of L1 (4T from center tap)
L2: 8T centered around tap on L1
L3: 4T centered around tap on L1

LF version (1.8-13 MHz):

L1: 26T #22 or #20 on T106-2 (red) core, center-tapped at 13T to case L1 upper-range taps: 5 turns from ends of L1 (8T from center tap)
L2: 18T centered around tap on L1
L3: Taps on L2 at 4T each side of center tap on L1, 8T total
C2: 546pF polyvaricon (2 sections, each 273 pF)
C3: 546pF polyvaricon (2 sections, each 273 pF)

Added capacitors on S4 and S5 are each 510 pF 500V silver mica

VHF version (20-80 MHz):

L1: 6T #14 on T90-10 (black) core, center-tapped at 3T to case. No upper-range taps are used in this version.
L2: 4T #18 centered around tap on L1
L3: Taps on L2 at 1T each side of center tap on L1, 2T total
C2: 63 + 148 pF polyvaricon—SPST switch S8 (not shown in drawing) used to remove 148 pF section for higher frequency use
C3: 63 + 148 pF polyvaricon—SPST switch S6 (shown in drawing) used to remove 148 pF section for higher frequency use.

No added capacitors are used in this version

The Dan Tayloe bridge is almost flat through 50 MHz. I used 1W metal oxide (MO) resistors in this unit; I also used small coax for the bridge connections. ●●

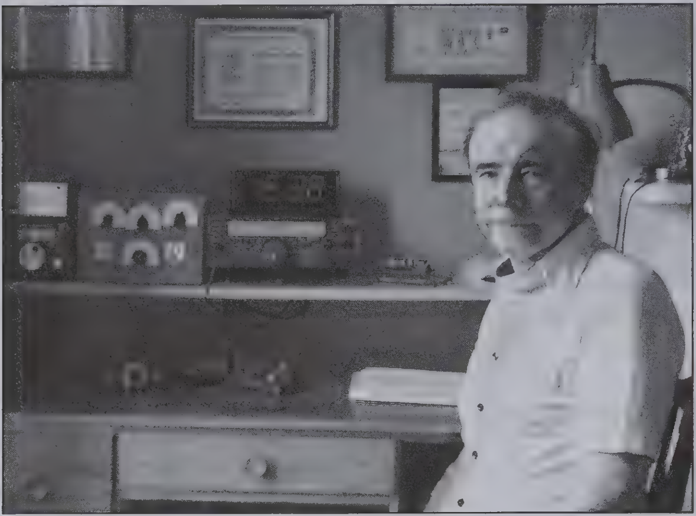
Do you have a personal QRP story?

Excitement can be contagious! Interesting stories about QRP experiences and motivations can help build enthusiasm for this fascinating part of the ham radio hobby.

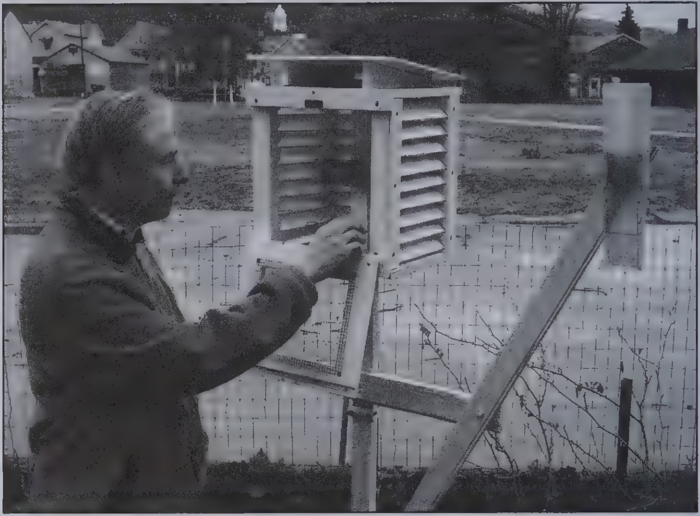
If you would like to contribute your memories and reflections on QRP, just write down some notes and send them to the Editor at: editor@qrparci.org

5,000 and Counting: The Remarkable Operating Streak of John Shannon, K3WWP

Tom Mitchell—WY3H
yoel@arm-tek.net



John at his current-day operating position.



John checking some of his weather instrumentation.

Fourth of July fireworks were in order on April 12 for John Shannon, K3WWP. That's the date John completed 5,000 continuous days of making a minimum of one QSO a day. And to boot, they were no ordinary QSOs, but every one was made CW QRP using simple wire antennas. John started his QRP marathon on Aug. 5, 1994, and as of April 12, 2008, he has logged exactly 47,550 QRP CW QSOs, 13,422 of which were DX.

Hmmmm! How does John "just happen" to have all these facts and figures? If you guessed that he's an incurable record keeper, you guessed correct. Although his QRP radio log dates back even further than 1994, that's nothing compared to his weather logs. Besides being what we could say is one of the most dedicated amateur radio QRP operators extant, he is also a weather buff and amateur astronomer. John's weather records, consisting primarily of daily high and low temperatures and precipitation, date back to Jan 1, 1960. Oh yes, he is also a die hard catch-and-release fisherman and has compiled several decades of records detailing the fish he's caught—and released to live a while longer.

John began his amateur radio "career" on April 3, 1963, when he received the Novice call KN3WWP. Since then, his total number of QSOs is some 67,000. In August of that year he upgraded to General class. In true amateur spirit he began operating with a homebrew rig that he built, a crystal controlled transmitter using a 1625 final (the 12-volt version of the popular 807). For his early days of radio John used an old J-38 straight key that was used by his uncle on the railroad. In the 1980s he built an Iambic keyer, a WB4VVF Accu-Keyer. Some of John's homebrew equipment is shown in Figure 2.

"In those days anything less than 100 watts input power to the final was more or less QRP," he said. "My rig ran about 75 watts to the final giving me about 50 to 60 watts out. As a Novice I used it on the 80, 40 and 15 Meter bands. I did work a little DX on 15 Meters, Puerto Rico and the Canal Zone. But back in those days television had an IF of about 21 MHz, so it was very easy to cause TVI when operating 15. I learned that real quick, so most of my operating was confined to 80 and 40 Meters. I wanted to work DX so that was an incentive to get my General class so I could use 20 Meters. When I upgraded I got an old Lafayette VFO. It freed me from the crystals but it drifted bad, so I took to leaving it on almost all the time so it would be warmed up." About 1982 QRP was pretty much defined as operating 5 watts or less output power on CW and 10 watts PEP SSB.

John took more or less of a hiatus from radio in the early 1970s through the early 1980s while working for radio WPIT, a religious broadcast station in Pittsburgh. Working for WPIT meant he did just about everything from engineering to sweeping floors, everything, that is, except selling air time.

"I operated phone exactly 6 times," he said, "and that was in the 1960s when I was testing or setting up radios for some friends. Other than those six times, all my operation has been CW. I got back into regular radio operation starting Feb. 15, 1993, when I retired from WPIT. From that time on I was operating strictly QRP, 5 watts or less. In 1982 I modified my old home brew transmitter to operate on 30 meters. That became one of my favorite bands. I made my first 30 Meter QSO Nov. 9. If I recall, RTTY was the only digital mode and there wasn't much of that. You could operate CW from 10.100 to 10.150 with the exception of I think 10.109 to 10.115."

In 1989, John said he got a new neighbor that in a strange way served to launch him on his seemingly never-ending quest for a QSO-a-day, every day. His neighbor, Eric Bowser, learned that Shannon was a "ham" operator and was fascinated by John's activities. The two had another common interest, all kinds of sports, but primarily baseball.

"I guess that's how it all started," John said. "Eric and I were very interested in sports records. For one thing, records were always being broken. I guess they were meant to be, but some sports records stood for a very long time. Joe DiMaggio had his 56-game winning streak, Lou Gehrig played 2,130 straight games, but that record was shattered by Cal Ripkin who played more than 2,600, and so on. Well, Eric wondered how many consecutive days someone could operate radio, making at least one QSO a day. I took it a few steps further. I added operating QRP CW using simple wire antennas. Eric made the challenge to me in Sept., 1994. I checked back in my log and found that I had made a QRP CW QSO every day since Aug. 5. So the challenge was on and it's still on today."

John said Eric Bowser was eventually licensed as KB3BFQ and began operating using an Index Labs QRP Plus, CW of course.

The first QSO of John's 5,000-day streak was with KG9N/C6A, who was operating from the Bahamas. Although KG9N sent him a QSL card to mark their first QSO, he followed up 10 years later with a 10th anniversary QSL card after discovering John's Web site.

While QRP operating might seem to have serious limitations for some, you'll never convince John. Since his streak began in 1994 he's logged and confirmed 199 DX countries. Some of his rarer catches include JT2DA, Mongolia, made March 4, 2000, on 15 meters, and VK6HQ, Perth, Australia, made on 30 Meters, June 19, 1999.

John said he has one regret, the six unconfirmed DX countries that have kept him from breaking the 200 mark. "One was 7X4AN, an Algerian station. I sent QSLs via the bureau; I sent him 'green stamps' and IRCs. But to date I've never heard from him. By the way, my Mongolian friend sent me some Mongolian money, a 10 Tugruk bill. I found out it was worth about .807 cents."

Since 1999 John has been using a Kenwood 570 (at 5 watts out, of course) as his primary rig and an attic random wire at 110-feet (with about 21 bends). Although he works all HF bands he is most often found on 40 or 80 meters, 7.040 or 3.559 MHz.

In October of 2005, John and the author founded the North American QRP CW Club, offering free membership. The club now boasts an international membership of more than 2,300. He is also a FISTS member, No. 2002, and writes a regular column for FISTS magazine, *Keynote*. If you haven't worked him before, or haven't worked him in a while, listen around the common QRP frequencies and say hello. He's not a "599, PA, 73" type operator. If you're willing to tap a key for a while he'll be glad to rag chew, and, he'll give you an honest RST.

Author's notes:

John had to go into the local hospital in March to have a stent removed, delaying the interview for this article a few days. This is an outpatient procedure, and of course, John arranged the timing so that he could still make his daily QSO Friday and Saturday. Only John would do such a thing. I took him to the hospital about a month previously to have the stent installed, and he did the same thing. He insisted in getting home before 0000 Zulu to make his QSO! As I said, "Only John...!"

The author, Tom Mitchell, WY3H, along with John Shannon, K3WWP, founded the North American QRP CW Club in Oct. 2005. Mitchell began operating QRP in the mid-1980s as KC3YD while living in Schuylkill County, Pa. He is a staff writer for the Leader Times, part of Tribune Review Publishing, Pittsburgh, Pa, and now resides in Manor Township, Kittanning, Pa. with his wife JoAnne and twin sons, Ariel and Ethan. Ethan is KB3QGW.

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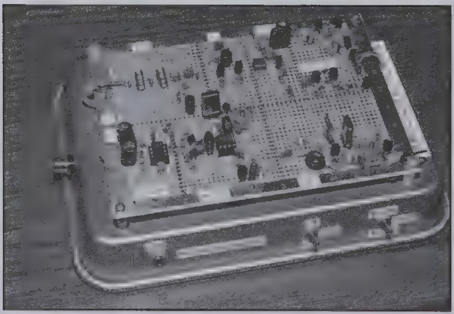
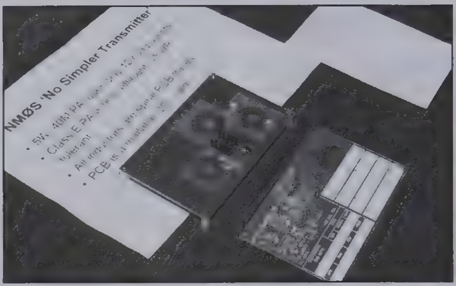
2008 FDIM Building Competition and Show & Tell

Ted Bruce—KX4OM twbruce@bellsouth.net

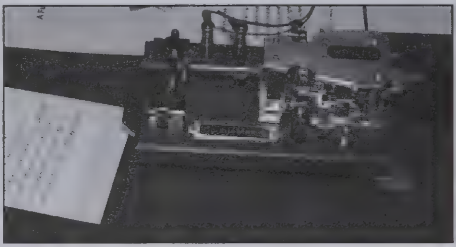
The Homebrew Competition this year had some interesting, and you might say curious, entries. Actually, there was something for almost everybody who attended, from quarter-century-plus practitioners to budding prodigies. Awards were presented in the following categories: All Homebrew, Modified Homebrew, Station Accessories, Antennas, with a top award for Best in Show. This was my first FDIM, but I had a number of people who commented on the number and variety of homebrew objects (and some were truly objets d'art), the build quality and the ingenuity of the builder.

Before listing the award winners, I'll try to give meaning to the words of the previous sentence. We had a QRP transmitter with an 807 final PA stage. Another transmitter whose PA was just about the only component. A transceiver with a VXO that spanned 100 kHz at the operating frequency. An all-mechanical, fully automatic CW key that included pneumatic damping pistons and cylinders. A CW paddle that was constructed of plastic tableware and relay parts that fits in one of the long, narrow Altoids tins and it worked great (to the extent that a confirmed J-38 straight key guy—me—can make that a valid comment). There was a very nicely executed 2N2-XX Manhattan-style transceiver by a first-time builder. And a 7 MHz transmitter whose inductors were spiral traces on the rig's PC board (no, that's not a typo: 7 MHz, i.e., 40 meters—not 7 GHz). There were a number of fine rigs and accessories from the JA Jamboree Building Day. I'm getting close to divulging the competition winners, but one more nugget of information, first. One of the transmitters operates Class E. Now, seriously, how many of you can explain what Class E is? Mmm, not something we see every day, right?

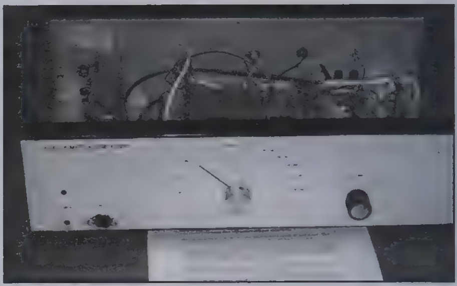




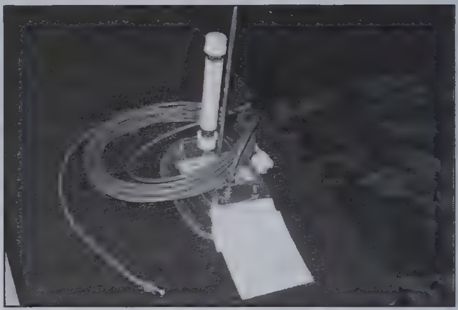
All Homebrew: David Cripe, NM0S—40m Class E XMTR.



Station Accessories: Richard Meiss, WB9LPU—Double Max Bug.



Mod. Homebrew: Harold Smith, KE6TI—6m SSB XCVR.



Antennas: Jeff Hetherington, VE3JFF—Hotel Antenna.

Anyway, here are the category winners:

All Homebrew: David Cripe, NM0S—40m Class E Transmitter (whose blank PC board doubles as a QSL card).

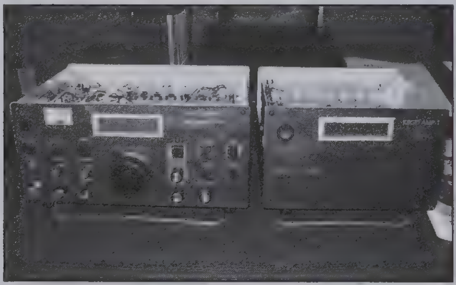
Modified Homebrew: Harold Smith, KE6TI—6m SSB Transceiver (the IF is the Roger Hayward, KA7EXM, Modified Cascode PC board).

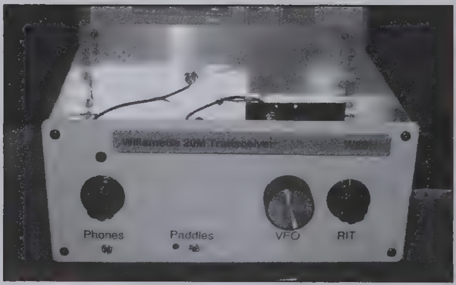
Station Accessories: Richard Meiss, WB9LPU—The Double Max Bug (this fully mechanical bug sends dots and dashes automatically; it uses two cylinders and pistons in the base to provide pneumatic damping for the moving lever).

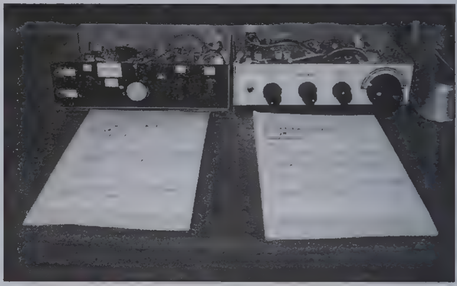
Antennas: Jeff Hetherington, VE3JFF—The Hotel Antenna (Jeff and family left Dayton for a "hamcation" of the Eastern Provinces and Maine)

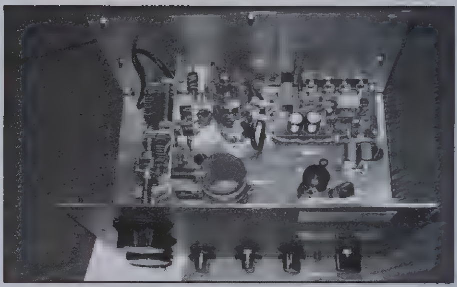
Best in Show: David, NM0S—for the amazing 40 meter transmitter.

Additional photos are included below.









Designing a QRP Backpacking Station—A Systems Approach

Gary O'Dell—KE7OTO
ke7oto@arrl.net

Over the past 10 years, the ultralight backpacking movement has spurred the development of several new products to reduce pack load. One of the basic tenets of this trend is the attempt to design or combine at least two uses into as many gear items as is practical: trekking poles become tent poles at the end of the day; sleeping pads become load-transferring structures for pack bags. Single-wall tents, bug screens, and silicone-nylon tarps replace heavier tent designs. The ultralight trend seems to be more of a "systems" approach to backpacking.

Inspired by this trend, and wanting to take a QRP rig on the trail, I thought about a QRP station as an integrated system, to combine uses of the various necessary features I would want to take along. The overall "want" list was short:

- 40-meter transceiver
- Battery pack good for about 24 hrs of operation between full charges
- Lightweight antenna system
- Some degree of solar-assist capability
- Maybe a light for copying code in the dark

I also made a list of things that tend to add weight, which might be minimized or designed out of the entire system. These items included:

- Separate antenna tuner
- Balun (choke or toroid)
- Heavy battery pack

I was not necessarily interested in contest work, but wanted a system that could operate from the sides and tops of the mountains I plan to visit with increasing frequency (no pun intended!). And finally, the design should be open to experimentation for further weight reductions.

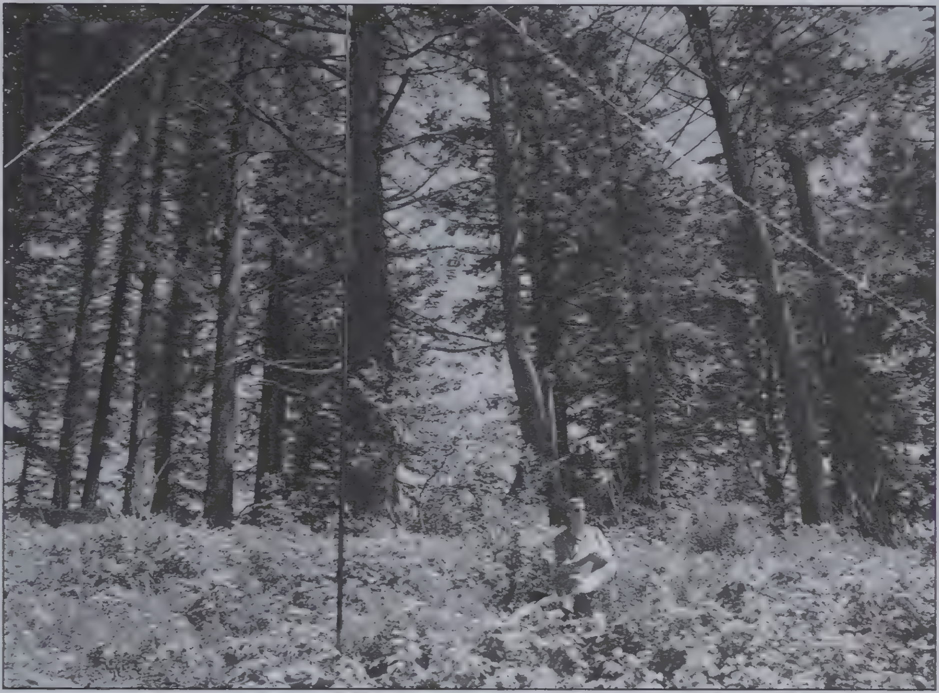


Figure 1—40 meter inverted vee antenna.

Transceiver

For the 40-meter transceiver, I looked around for a QRP kit-type unit with a good set of features and a power output of between 1 and 5 watts. I preferred a design that had low power requirements, had a minimum of external controls, and was relatively immune to accidental frequency changes. I also preferred not to have a lot of button-activated menus to access the main functions—probably due to my old-school SWL activities some years ago.

After looking at available rigs designed in the past few years, the Small Wonder Labs DSW-40 by Dave Benson seemed to fit the bill nicely. This rig is out of production at present, but I found one online that was already built up. The sensitivity and low RX power draw, small footprint (2.8" × 4"), encoder tuning, a handy fine-tuning function, RIT, and keyer (not that I needed it for speed just yet) offered plenty of options. With 2W out and the option to mod in a bit more, it seemed to fit the bill nicely.

The DSW-40 requires 12V at just 40mA on receive, and about 300mA key-down. With a conservative (for me) key-down duty cycle of 25%, the weighted average power requirement is just over 100 mA, which would save battery pack weight.

Battery power

I looked for rechargeable batteries that were readily available, as well as something that was not too finicky in charging requirements. Another criterion was for the batteries to be OK with trickle charging, as I was planning some type of solar panel assist. I wanted to have enough power to operate for, say, a 3-day excursion running a few hours per day, with full charging at home between trips, but with the option of some solar assistance.

The Eveready NiMH 1.2V AA cell seemed to be very available online, and had ample capacity at 2500 mAH, an obvious advantage over NiCd. Ten of these cells would provide a minimum of a quite-usable 10V and a maximum of nearly 14V when fully charged.

Lithium cells were also available for higher power density (about half the weight per cell of the NiMH cells), but had more complex charging requirements (OK for at-home or in-car charging between hikes) and trickle charging is not recommended. So I opted for the NiMH pack.

Antenna

I was already sold on the Inverted-V antenna design, as I was having good success with a 20M version that was tunable

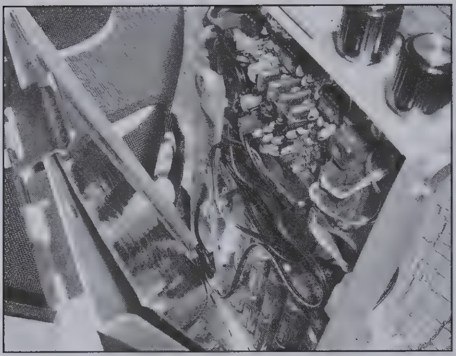


Figure 2—The backpacking station ready to travel.

on several other bands. The inverted-V has a decent match to 50O feedline, and I thought its near-vertical launch characteristic would be useful. I was also looking to minimize feedline weight, so RG-174 coax was on the list as well.

My ARRL Antenna Book includes a wealth of information on matching unbalanced feedlines to dipoles, and one fact emerged to simplify the design: if a coax feedline is an odd multiple of λ/4, the common-mode current loss flowing on the outside of the outer conductor is minimized. This meant there was the opportunity to run without a balun anywhere in the system.

On the other hand, RG-174 is relatively lossy, so keeping the feedline to a minimum length would be a help. At 40 meters, the λ/4 rule dictated a feedline length of either 33 feet or 100 feet. By situating the top of the antenna to within 33 feet of the transceiver, the feedline power loss should be only 20% (1 dB in 33 feet). This was an acceptable tradeoff for simplicity and lower weight.

The antenna was fabricated using split 22 gauge stranded speaker wire, and I planned to loft it with a collapsible 33-foot fiberglass pole. Speaker wire is cheap and available nearly everywhere. Lightweight nylon line and rocks could secure the outer ends of the V. The top insulator was fabricated from polycarbonate with holes drilled for the pole top ferrule, dipole elements, and a hole in the top in case I was lucky enough to find a tree to hoist the antenna. Figure 1 shows how the antenna looks in action. I planned for the pole-supported approach since my intended operating positions were higher-altitude areas generally devoid of trees, altitudes perhaps matched by my equally high hopes of reaching out a couple of thousand miles with my "new" portable rig.

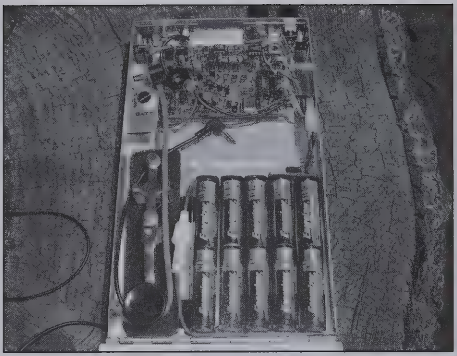


Figure 3—The backpacking station from another angle.

Enclosure and Layout

All radios need enclosures of some type, so I opted for a case that could be used for other functions also, like containing batteries, accessories, and copying code. I happened across the Saunders aluminum portable desktop product (http://www.saunders-usa.com/core/) while searching for a low flat aluminum enclosure, and used that for the box. It would not take up much space in the pack, and I thought the "desk" surface would be handy for both sending and copying. And, as a bonus, they were available at a local business supplies house.

Solar power assist

I had found some flexible solar panels manufactured for model airplanes that looked intriguing for trail work. Of course, there are roll-up power systems available for backpackers, but the cost and bulk seemed a bit of an overkill. I was looking for a simple system that would partially counter the occasional battery drain caused by my operations.

I found Silicon Solar online (http://www.siliconsolar.com/solar-panels.html), and they offer a line of charging systems as well as bare panels. As luck would have it, one of them was a good match to my power requirements, as well as being exactly the right size to fit inside the portable desktop. At 15VDC and 100mA, I could run off the solar panel during mid-day without drawing from the batteries. And, if necessary I could charge the battery pack, although very slowly at about a C/25 rate. At that rate, a charge controller could certainly be avoided.

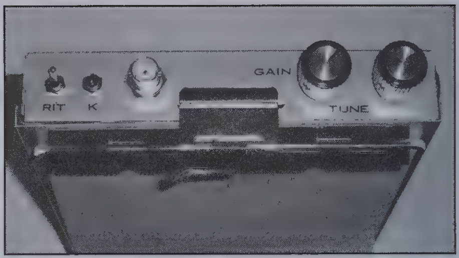


Figure 4—Transceiver controls.

Layout

Figure 2 shows how the station appears when it is packed in the portable desk. Figure 3 gives a bit more detail, with the desk lid fully open. The transceiver is in the body of the portable desk, near the top. The battery pack is near the bottom of the desk, and the space in between holds wiring and accessories. The solar panel is shown stowed in the desk top.

Figure 4 shows the transceiver control layout, as mounted in the portable desk. In operation, the paper holder is right side up, making the labels appear upside down when viewed from the front.. Tuning and Gain controls are mounted so that I am able to operate them conveniently with one hand while holding the "desk" in the other. The RIT and keyer setup switches are mounted to the left of these controls. This put all controls on top and, with the push switch functions in the main tuning control, all functions are located close together.

The power switch and battery meter are located inside, since they're only needed twice during any session. Using parts from an old-school practice key, I fabricated a low-profile straight key that would fit inside the case for travel. The phone and key jacks are mounted on opposite sides of the case to prevent the cords from interfering with each other. Since I'd be using the key right-handed and the RS-174 feedline would exit from the BNC connector mounted on the top, all cables should stay clear of each other most of the time.

Lights

Adding a couple of white LEDs on a stalk over the writing area of the "desk"would make it convenient to copy code in the dark. However, I was not keen on spending a lot of power just to do that. The series resistor is a point of inefficiency for most LED illumination systems, so I thought about various PWL drivers to reg-

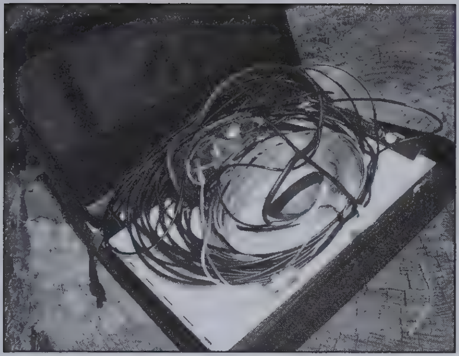


Figure 5—The backpacking station in its travelling case.

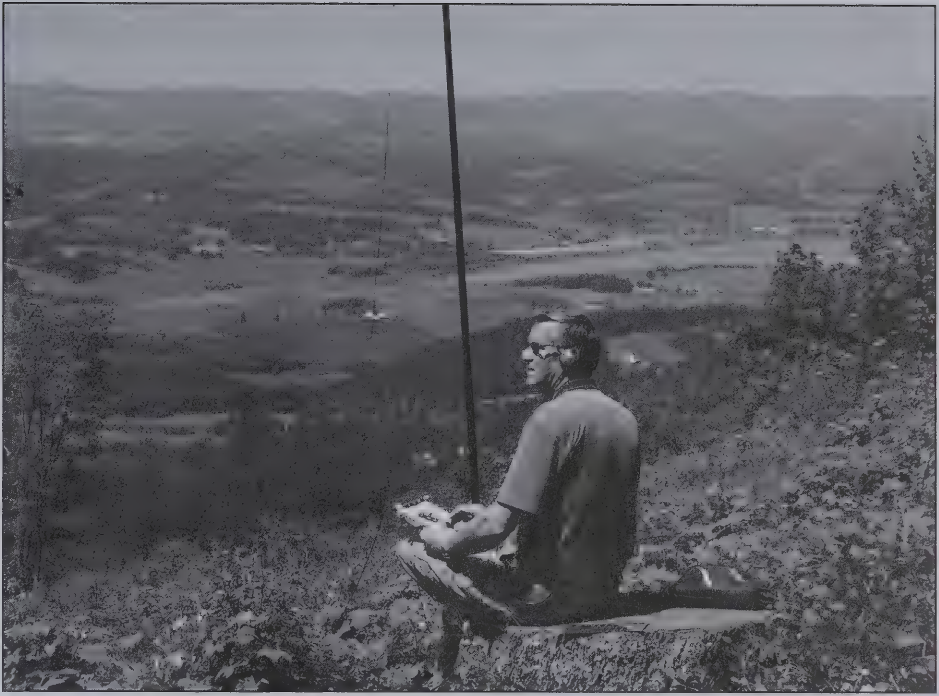


Figure 6—Operating on a mountain side.

ulate the current and eliminate the power loss in the resistor. The downside is that could create switching waveforms that could interfere with the receiver. Due to the small amount of light actually needed, I opted for the simplicity of dual series LEDs and the series resistor. Power requirement is 10mA at average supply voltage, in fact a small fraction of the battery pack capacity. And, the incremental weight is nil compared to the weight of a separate flashlight (again with the ultralight philosophy).

Initial Results

The entire system sans the collapsible fiberglass pole weighs in 43 ounces including rig with batteries, key, antenna and feedline, and phones. The estimated operating time is 24 hours with freshly-charged batteries and a 25% key-down ratio. The entire rig less the collapsible fiberglass pole fits into an empty 7" × 12" × 2-1/4" nylon CD case. See Figure 5.

After setting up the system in Bald Peak State Park on a hillside facing west, the overall system was checked out. That's me in Figure 6. The antenna and feedline were light enough to be held up with the collapsible pole, provided a third leg of nylon line was used to guy the pole uphill. The setup and take-down was quick and easy, and I got about a 1.3:1 SWR without any dipole trimming. There was not much activity on 40M mid-day that day, but I did try to answer one station a couple of hundred miles to the east. He was situated on the other side of the hill behind my antenna, so no luck there.

Another trial was done from Timberline Lodge in the Oregon Cascades, around 6000' MSL. I set up the "V" on a north-south line with a clear shot to the east on a beautiful clear afternoon. After a lot of listening and a few non-responses to the south, I was happy to raise Ken Munford, N7KM, in Cedar City, UT—thanks Ken for the first contact on the DSW!

Future Mods

The heaviest single component is the fiberglass antenna pole, so that's top of the list for a lighter solution. Perhaps a shorter pole and a flatter "V" could be tolerated and may still have enough height to produce a decent signal.

One area for improvement of the rig itself is in the weight battery pack. If one opted solely for the charge-at-home approach, a Lithium battery pack could save several ounces of pack weight. There are also some minor I-R losses in the battery interconnection leads, fuse, and the series protection diode on the DSW. Total losses in this department are about 150mW, most of which is spent in the battery fuse I wired in (DIN 0.5A 250V).

From the DSW mods posted online, there may be an additional 50% or so power output that could be gained, at the cost of some reduction in operating time with the current battery pack.

A twinlead-fed dipole may not add much weight and may save some feedline loss, so that design bears some looking into as well. I'll be open to test anything that boosts power to the antenna without adding weight.

Next trip, I'll go for higher operating elevation to try for some DX. At the moment I have my eye on the east side of Mount Hood, generally clear and accessible as soon as the snow melts!

Inspirations

New projects are usually inspired by others. My "short list" for this one included:

- Ray Jardine, whom I would say is the pioneer of ultralight backpacking (www.ray-way.com)
- Dave Benson, QRP Hall-of-Famer; thanks for a great design! (www.smallwonderlabs.com)
- ARRL Publications (www.arrl.org):
- Low Power Communication, by Richard Arland, K7SZ
- ARRL Antenna Book, 18th Ed.
- QRP-ARCI (www.qrparci.org)
- Single-bander transceiver offerings by OHR, NorCal, KD1JV Designs, and others; I either own or will own one of each at some point.
- The Ham community at large; thanks for all the great ideas, stories, and photos!

—72 de KE7OTO

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A QRP SSB TRX for 6 Meters—Part 2

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Part 1 of this article appeared in the Spring 2008 issue of QRP Quarterly *[1]. Part 2 covers the remaining circuitry, packaging and testing.*

In the last issue, the basic transceiver, its design methodology, and the core receiver and SSB generator circuits were introduced [1]. I spent some time talking about parts used, and elaborated on why I made this transceiver for 6 meters. For this segment, I'll explain the receive audio, AGC, transmit audio, transmit power chain, and TX/RX switching. I'll show the packaging used and then wrap it up with a description of on the air results.

As mentioned last time, the PLL VFO is a modular design I did for multiple uses and deserves more attention than could be given here. Being a separate project, it is not covered in detail. However, there are several simple alternatives for a builder trying for a straightforward radio. A crystal VXO, VFO and crystal oscillator premix system, or DDS could be substituted for the 42 MHz LO used. As long as the substitute oscillator is clean and has good low noise characteristics, transceiver performance should be the same as presented here. Attention should be paid to ensure the LO power levels delivered to the mixers are in the 300 mV range or spurs and other ill effects will be noted.

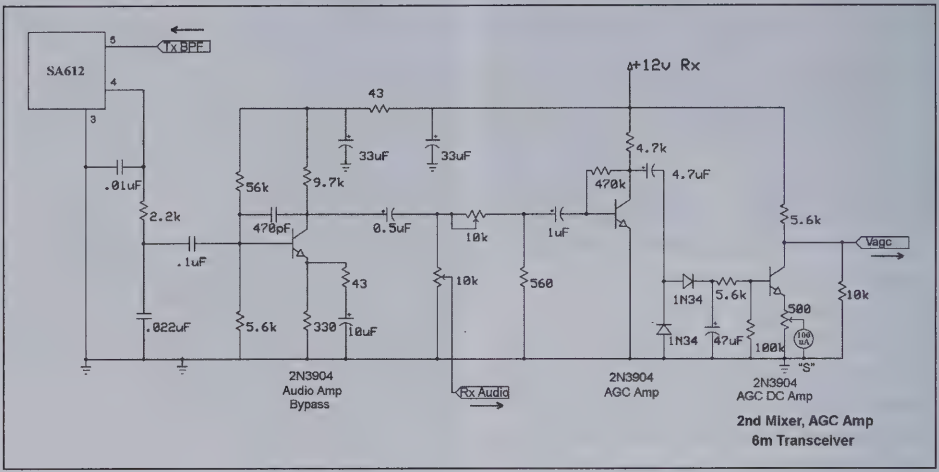

Figure 1—The 2nd mixer and AGC circuitry.

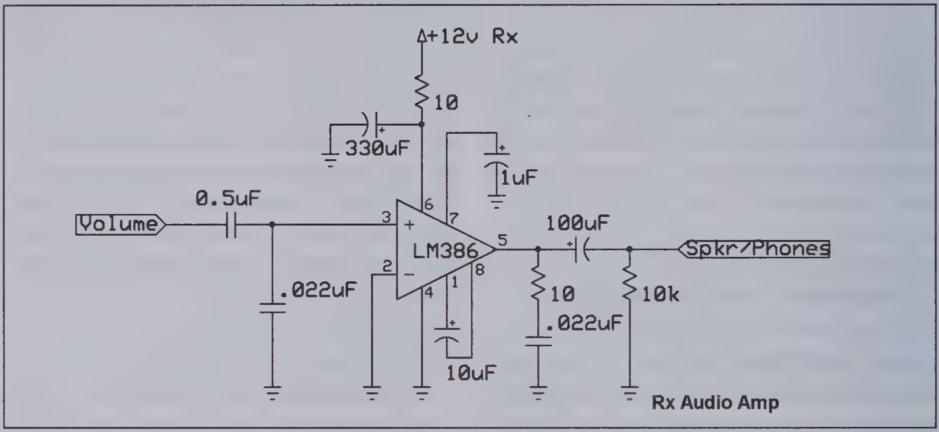

Figure 2—Receive audio amplifier.

Finishing Up the Circuitry

Figure 1 shows the receiver audio and AGC chain, starting with output from the second mixer. (Figure 8 in Part 1 of this article.) Comparing Figure 1 with the corresponding figure from Part 1, it will be seen that the audio output from pin 4 of the SA612 is a slightly different configuration. The difference, explained below, is due to some further testing. Primarily, I have added a straightforward audio preamp before the volume control, so that we have enough gain to drive the AGC detector and also have enough gain for the LM386 audio. Several things were also done to give an audio bandpass characteristic that rolls off the high frequency audio above 2.5 kHz. This makes the filter skirt selectivity appear better and also loses some of the high frequency hiss that can make extended listening hard. I also selected capacitors so that the low frequencies roll off around 250 Hz and we don't listen to more audio bandwidth than we need. This was done to suit my preference, but the results are crisper audio. The preamp output feeds the volume control for the usual LM386 audio, shown in Figure 2, and can easily drive a good communications speaker though I prefer phones.

The other circuit driven by the audio preamplifier is the AGC amplifier and rectifier, also shown in Figure 1. This portion of the circuit in Figure 1 provides a DC voltage for the audio derived AGC to the RF amp. While a simple circuit was used for the AGC, a bit of time was spent trying different timing components and also the amount of AGC gain. The component tryouts focused on the AGC timing capacitor, as small electrolytic capacitors can vary between –20% to +80% of nominal value. I had a few capacitors that were very much higher than their nominal value, and made the time constant longer than expected. For this reason, and because someone duplicating this design might suffer a similar fate, an AGC gain control was provided to allow adjustment of the AGC threshold.

This is the 10k ohm variable resistor leading to the base of the AGC amplifier. The AGC gain control is used to cause the AGC circuit to act with about 2 µV at the input, so that really weak signals and small amounts of noise would not initiate AGC action. I also added a simple AGC metering circuit to act as an S-meter. Full-scale on the meter occurs with an input signal of around 4000 µV, and "S9", or 50 µV signal input, is around 2/3 scale. For a simple circuit, it works and the attack and decay action is smooth enough for real signals - both SSB and CW beacons.

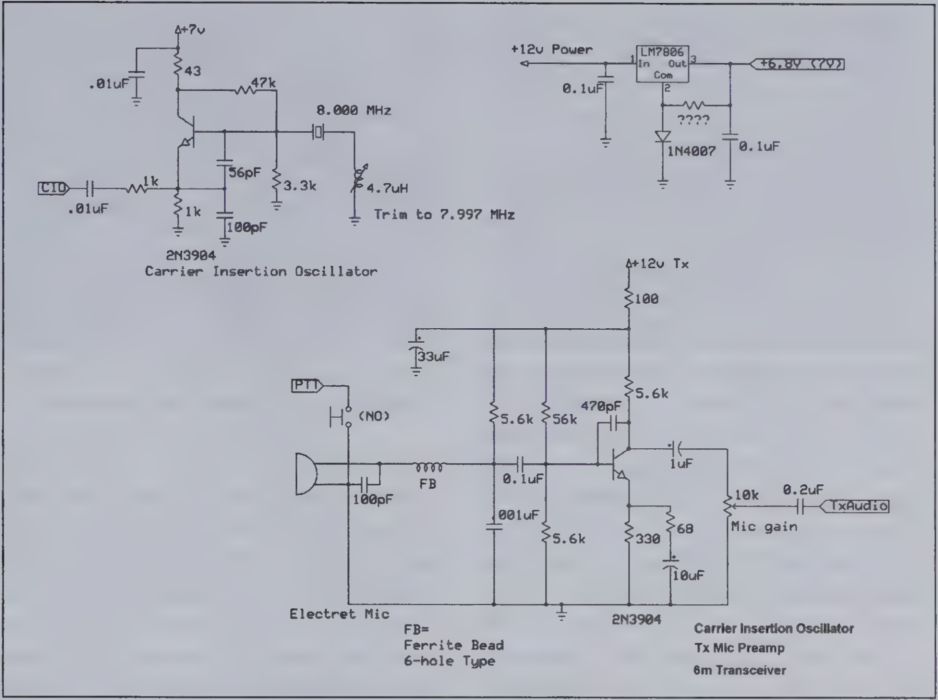

Figure 3—Microphone preamplifier and carrier insertion oscillator.

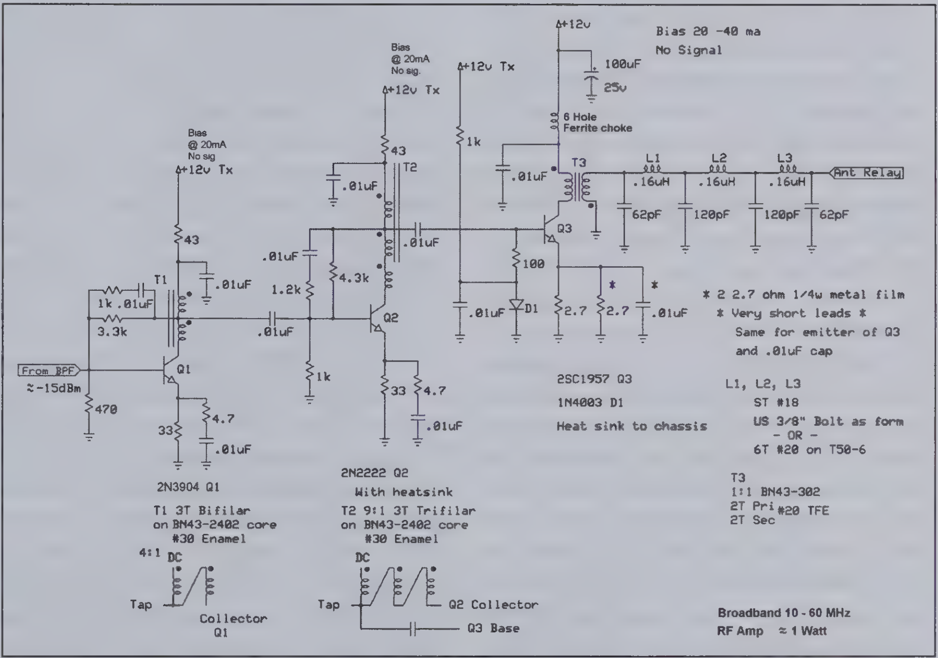

Figure 4—The transmitter power chain.

Satisfied with progress to that point, I started on the transmit audio circuitry shown in Figure 3. The circuit is a fairly simple, single stage microphone preamp but it provides ample gain when used with an electret-style microphone. Again, I contoured the audio bandpass to favor the 300 Hz to 2.5 kHz range for a bit more punch. Since there is no clipping or compression in this transceiver, a bit of tilt in the audio pass band can make a difference. Like all things, this was tailored to my preferences.

Figure 3 also shows the carrier insertion oscillator. This is a simple crystal oscillator, whose output goes to a relay for TX/RX switching as discussed in Part 1. The oscillator is left running at all times when power is applied to the transceiver.

At this point, I had a complete, working receiver and transmitting circuitry producing a very low power signal at the transmitting frequency. I now needed a transmit amplifier chain that would produce my target of one Milligallon (1W) output power. The result, with the parts I had on hand, was Figure 4. Signal input to this power chain is obtained from the bandpass filter attached to pin 5 of the second detector. (See Figure 8 in Part 1 of this article.) The widely available 2N3904 was used for the first stage of the power chain, and with 20 mA standing current its gain was adequate. The second stage used a very common 2N2222A, not the plastic PN2222 part but the TO18 metal can as I've found there is a big difference in overall performance. The 2N2222A is running with 30 mA standing current to insure class A operation and provide the 30-50 mW needed to drive the final amplifier. So, a small heat sink is needed for this stage. The final, third stage in this power chain is a 2SC1957. I used this particular transistor because I had one, and it was a reasonable sized device for 1W output power. This stage is different from many designs, as it's running at a high bias for the power out. Using 40 mA standing current ensured the stage was class AB and, importantly, very clean. At full power output, the amplifier requires 110-120 mA with the resulting power being 820 mW into a resistive load.

Thermal stability problems prevented reaching the full Milligallon, as explained in the next paragraph. At the 820 mW level, I had a stable amplifier on the first try. There was only a small additional effort spent on trying a choke feed to the collector of the final. But, I eventually went with the output transformer instead, plus the usual cleanup with bypass caps and some layout.

During testing I found that, even with the usual diode thermally coupled to the final, standing current in the 2SC1957 would increase to excessive levels. I ended up with adding emitter resistors for DC stabilization. As a result, I had to give up about 180 mW output for better DC stability and to stay away from RF compression at current peaks. I could drive the amp to nearly 1.2W, but above about 850 mW the linearity was not as good as I'd like. The good part is, if the audio peaks exceed my arbitrary 820 mW limit, splatter will be less likely until I exceed 1W. This was verified with other local stations and showed up as declining audio quality before they could see splatter. When testing and tweaking was concluded on the power chain, I found that the final amplifier achieved the 55% efficiency expected of a Class AB amplifier, and it was very clean.

Now, I had all of the major building blocks functioning and only needed to consider switching between transmitting and receiving. I decided to use relays for simplicity. Figure 5 is the result. True, the relays do consume some current, but the level is acceptable. The combined relay coils draw about 100 mA, but only on transmit, and I consider that a fair trade for simplicity.

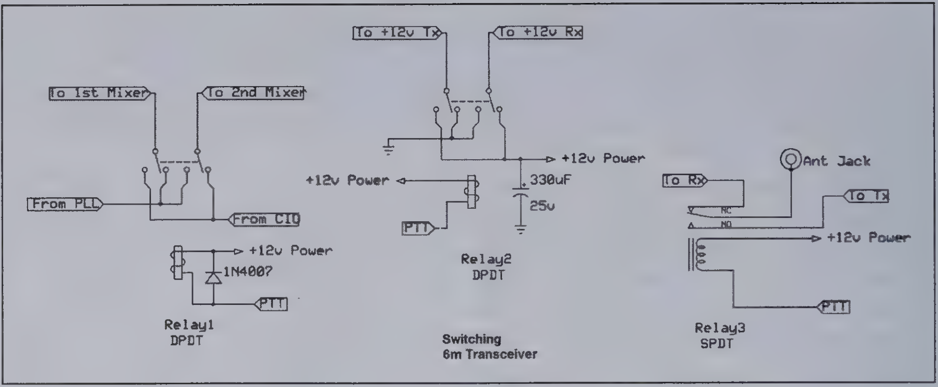

Figure 5—Tx/Rx switching circuitry.

There were also a couple of last-minute add-ons, which actually occurred during packaging. I added a white LED for meter lighting, as well as a red LED to act as a transmit indicator on the opposite side of the meter. The white LED cost 5 mA of RX power but makes the radio different from many as it also serves as power on indicator. The red LED is powered when the TX DC line is active. Another last minute add-on, not shown on the schematics, was a simple diode detector off the transmitter output. It's handy to know if the transmitter is actually generating a signal.

Packaging

The radio was in need of a package at this point. As is the usual case, I didn't buy a cabinet specifically for this project, opting instead to dive into the junk box and see what I could find. The end result was not something that a reader of this article would be likely to duplicate. However, some of the techniques used in constructing the package will probably be of interest, and might make your project a lot more affordable. As far as I'm concerned, that's part of the fun of homebrewing.

I'd been given a Hammond 1598D box at 8" × 2.5" × 7", and it was adequate room without being too large. So, I set out to package the radio. The box comes with aluminum blanks for the front and rear, but it's otherwise plastic. Plastic is ok, but it's hard to get a good ground and securing things meant a lot of metal work was needed. I chose a different route, using 1/16th inch thick FR4 PC board—single-sided copper for the front and double sided for the rear. It was a simple sawing task to make the proper size pieces. Then, a bottom was cut from a piece of FR4 copper clad scrap to fit closely between the front and rear. Figure 6 shows the result, before the pieces were soldered together. With the pieces laid out, all the holes were drilled, with the rear panel having the power cord and the front panel having the operator controls and jacks. Then, the three pieces were soldered to make the "pan" and end plates join. Adding gussets stiffened the rear.

The slab that had most of the electronics was laid into the rear and soldered down with some tabs made of copper to connect the slab to the pan ground securely. Now the case was taking shape, and the controls were connected. Some of the parts that were not located on the main chassis slab were placed in the added open area of the pan, and those include the mic preamp, antenna relay, transmit/receive DC relay and the 42 MHz LO PLL assembly. Figure 7 shows the work in progress.

The convenience of solder for assembly is apparent in the design. For example, when mounting the TO5-can sized TR relay next to the BNC jack, I simply soldered the can to the board right there and brought all the coax from the receiver and transmitter to it. Short leads and functional layout are easy to achieve. The result has room, but isn't large or boxy. You never know what may be added later, and a little space is handy.

The end result is a simple radio with minimal but functional controls, as shown in Figure 8. The control line up is, from left to right: power, attenuator (10 dB), volume, frequency—1 MHz, frequency—0.01 MHz, and the 10-turn dial pot adjusts the PLL's VXO through a 10 kHz span. Knobs were from a local ham flea market, and are very high quality anodized aluminum pieces. Add a meter, headphone jack and a three-circuit microphone jack, and the front panel is functional if simple. I may paint it someday, but it works fine for now.

Bumps and Curves

This is the part of the story that most designers leave out. But, I think it is an important point and one that may help new homebrewers from getting discouraged on their first few tries. Along the way on any project like this, there will be bumps and curves. Some were in areas that I expected; others were unexpected. Experimentation is what it's all about.

An example is the transmitter power chain. I had originally planned to use a pair of 2N3904s in parallel as a driver for the final, but they didn't work well at 50 MHz. Then I tried a push-pull driver. While it worked and was power efficient, it had more components than I wanted for a mere 50 mW. So, the poor 2N3904s were out and a 2N2222A was tried with much better results. Why the effort? Well, I could have just used a 2N3866, but those transistors are less common and more expensive. And, it bugged me to use a 2.5 W transistor for a mere 50 mW, especially when the final isn't being asked to do that much!

I also ran into grief with the receive audio chain. The LM386 stage sounded terrible, to the point of ripping it out and building around another new LM386 stage. Then, I found that the TELEX headset I was using had a bad earphone element. During testing, it's little things like this that can eat up time. The moral is "Be sure to check your test equipment and accessories to make sure they are working."

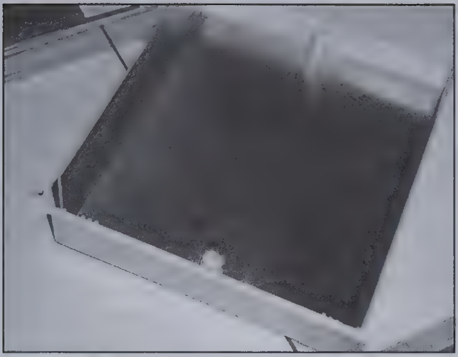
Figure 6—Making a pan for the chassis.

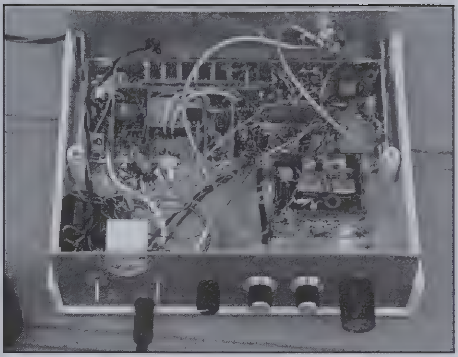
Figure 7—Adding in the circuits.

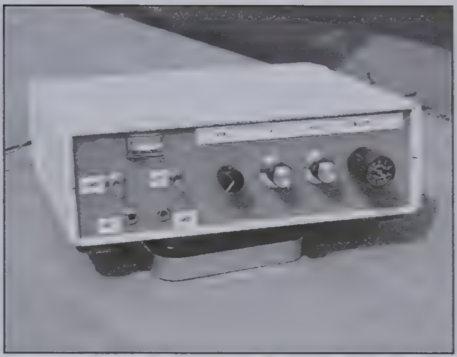
Figure 8—The finished product.

Buying parts that have turned themselves into "unobtainium" can also be a source of frustration. I wanted some nice BCD coded switches that used a pair of buttons to go up or down. This was for the encoder to the PLL. Well, the supplier ran out, and if I really wanted them I'd have to buy a full box (about 80 of them). That wasn't going to happen! So, a dive into the switch junk box netted a pair of miniature rotary switches of four positions and ten positions. With a bunch of diodes and wire and simple logic, I made a diode switch matrix that will supply the needed binary inputs to the PLL without a CPU. With the VXO having a 10 kHz range, this gives me a 400-kHz continuous frequency range, which is more than adequate for my purposes. The moral of this story is that there are often lots of means to the same end. Don't get frustrated and give up, when a little ingenuity can often solve the problem and often much cheaper, too!

One operating feature that turned out to be a welcome plus was caused by those rotary switches. The switches made it possible to set the basic frequency in the dark. Since both switches have stops, it's possible to turn them to the left till I am at the stops and then turn to the right counting starting with 0, 1, 2 and so on. This allows setting the 10 kHz frequency range in the dark, which can be very useful when light is poor in the field, and works out as a nice tactile feature.

The second good curve in the bunch was the donation of the Hammond box. It turned out to be an excellent package. Murphy doesn't always win, you know, and I did wind up with a good little transceiver.

How did it turn out?

I set out to create a new transceiver that excelled in low power operation, and I think I have hit the mark. A few days of on the air tests say it works, and it's already gotten "One watt! Home brew? You're kidding!"

The 6M E season has started, and I have had the opportunity to try a few Es contacts with it. It got EM79(GA), En51(IL) and EN81 (Ohio) in the space of a mere 10 minutes. Not bad for 1W input to a homebrew, 4 element beam at 35 ft! The AGC works well in real on-the-air action, and I get good reports on the transmit audio. I also tried it with my small solid state 100W amp (another project). The result is 10W of clean output power. So if I need a modest boost, I can do that too.

The radio is light, at less than 2 pounds with headphones and microphone. This is much better than my first 8 lb. radio, and far easier on batteries. This radio is tiny enough for a small case to hold the radio, battery and 35 ft of RG8x coax. But the goal was also low power consumption, and on receive the unit draws a light 85 mA at 13.8V at low volume into headphones. With the transmitter active at full output, it's using a modest 285 mA. This makes the transceiver very friendly to a small 2.3AH, 12-volt gelled electrolyte battery, with a receive life of over 24 hours and a 10% transmit/90% receive duty cycle time of over 12 hours. This power requirement balanced against a small 3W solar panel means days of operation are possible in the field.

The receiver is as sensitive as any I own or have available for comparison. On the air comparison on receive says this rig hears with the best. Testing shows that the receiver is more than adequate, with a MDS around –139 dBM and a 10 dB signal plus noise to noise ratio occurring at –130 dBM.

The six-crystal filter provides good selectivity with better skirts than many small radios with filters having only four crystals. The use of six crystals, besides being measurably more selective, also sounds better with strong adjacent stations on the air.

The in-band overload capability is not stellar, nor was that a design goal. With a 10 dB attenuator up front, the receiver works well in practice. AGC range is limited by the one stage, but is comfortable and adequate to level an active band with mixed signals. Between the crystal filter and the audio bandpass filter, the received sound pleases my ear. One thing that you only find out with on the air listening is how good any receiver sounds with several signals on the same frequency, and I'm very pleased with this one.

The transmitter is a few milliwatts short of the goal of 1W, but only by a little. I could have spent a bit more time and gotten the missing 180 mW. But in the general scheme of things, it is barely 1 dB down. Then again, based on 1 dB compression power of 1W and on air testing, I am on the conservative side. I checked carrier suppression and it is better than 45 dB, and that beats some of the radios out there. More importantly, the transmitter has low overall power drain, is clean, and from all reports good sounding according to local contacts in a 40-mile radius from the QTH.

Some Final Thoughts

This is but one way to build a SSB radio. Over the years I've built many other radios, and read articles on other transceivers of varying complexity. I didn't break any new ground with this one, but tried to build a solid straightforward radio that works and uses nothing out of the ordinary. Unlike many of the radios I have built from my large junkbox filled with oddball and extinct parts, this is the rare radio that is built with parts that can actually be bought, best I can tell.

In the end, it's a nice low power radio that likes battery operation and sounds good to my ear. With a Vectronics/MFJ 3-element beam at 3 pounds that fits in a 6-foot tube when disassembled and a few lightweight 5-foot TV masts for portable ops, the whole portable pile is light though bulky. But, the radio portion is much lighter than earlier radios. Like many projects, it had to fit into the time between sleep, work and all the household chores that just have to be done. But, it was such fun that I'm already thinking about another radio—for HF this time.

Some would be surprised that the primary tools used to build this radio are common ones, and not a lab with all the exotic scopes and spectrum analyzers. The exotic tools are certainly nice to have, and I have many. But, I do the most with fairly basic tools, and you can, too. The workhorse items were a simple diode RF probe, dummy load and milliwattmeter, a good multimeter with current scales, a decent radio to both compare to and listen to the output, and my ears. The only pieces of measurement equipment were a signal generator with good stability and a frequency counter, and these were indispensible.. A lot of listening to the output and observing meters was done before it ever had an antenna connected.

References

[1] Parent, A., "A QRP SSB TRX for 6 Meters, Part I," *QRP Quarterly,* Spring 2008, pp. 36-39.

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The Plug PiG—Handy Power Protection

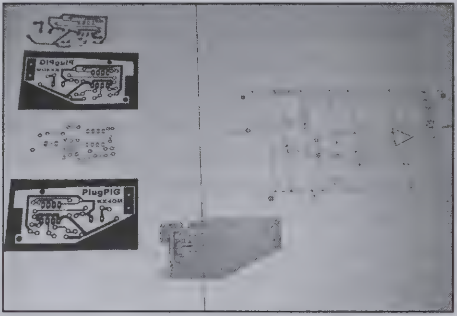

Figure 1—Schematic and PC board for the Plug PiG.

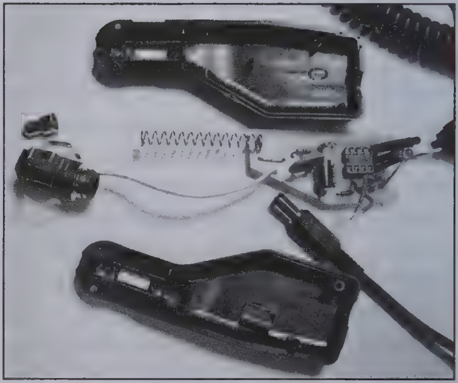

Figure 2—Assembling the Plug PiG.

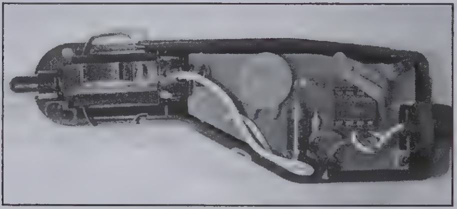

Figure 3—The assembled Plug PiG.

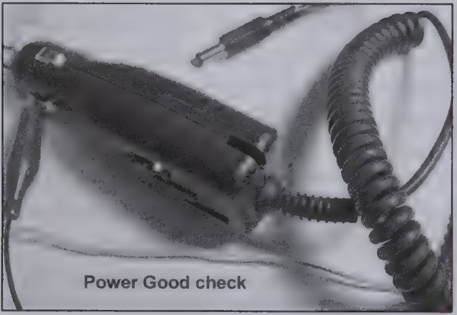

Figure 4—"Power Good" check.

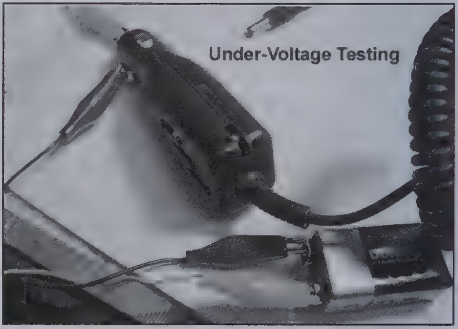

Figure 5—"Under Voltage" testing.

If you've built the NoGa PiG, I don't have to tell you how useful it is. No more blown fuses to your QRP rigs and accessories. Everything I connect to my battery on the workbench or in the field is protected by this handy unit, which is typically built in an Altoids tin. Since I occasionally operate QRP mobile, and I sometimes use the DC socket of one of those hefty emergency battery units that are used to jump start a car, I thought it would be nice to have PiG protection anywhere, any time.

Like the original NoGa PiG, the Plug PiG uses a 3-amp-rated shunt reverse power diode, an LM311 used as a voltage comparator, and a Polyswitch RXE135 resettable fuse. The Polyswitch device is rated at 1.35 amps hold current, 2.7 amps trip current and 40 amps maximum current on overload or short circuit conditions.

In reengineering the PiG functionality for a much smaller case, I decided to leave out a few features. I didn't need the optional keyer and audio noise suppression, since this was to be power protection only, and since it's designed strictly for battery-powered use, I could leave out the overvoltage protection features. First, I traced out the existing PC board of the cell phone charger/DC adapter. I created a schematic of the needed functionality in EAGLE Cad, and next I laid out the components to fit the required footprint of the PC board. Then it was a matter of stuffing the board and testing the short circuit and undervoltage features of the unit, following the instructions from the original NoGa PiG. One other addition I made is a "Power Good" LED to let me know that the socket I'm plugged into actually has power to it.

Included here are several photos of the unit as I proceeded through the design and construction. If you are interested in making the Plug PiG, or the original NoGa PiG, you can find the NoGa PiG schematic and parts list at www.nogaqrp.org.

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A Phasing Type Transceiver for the 60 Meter Band: Part 3

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RF Power Amplifier Module

The RF Power Amplifier (RFPA) module receives low level RF energy from the exciter module, via a bandpass filter on the Oscillator-Filter board and amplifies it to a level of approximately 5 watts. The amplified signal is sent back to the Oscillator-Filter board, where it is lowpass filtered prior being sent to the antenna. The module consists of three stages of amplification, DC power control circuits and metering circuits for monitoring the DC supply voltage and DC current of the final amplifier stage. A block diagram of the RF power amplifier may be seen in Figure 30.

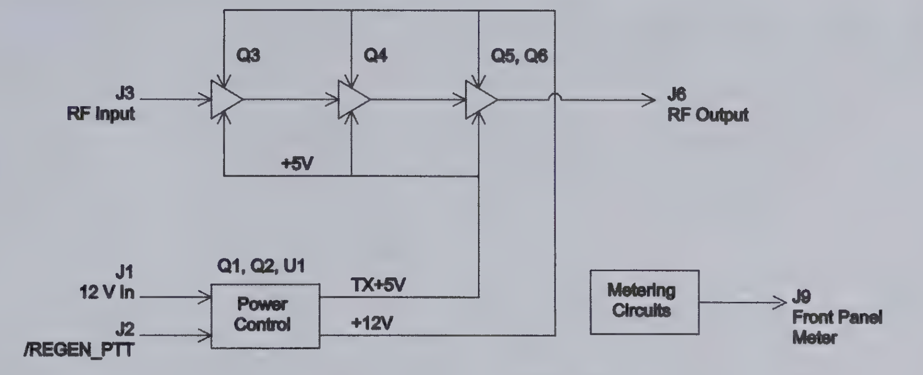


Figure 30—Block diagram of the RF power amplifier section.

Admittedly, design of linear RF power amplifiers is an area that remains somewhat of a mystery to me. Armed with a lack of knowledge of how to properly design my own amplifier circuit, I began looking at various other designs that were published on the internet. One I found that appeared to be suitable, was that used in the Elecraft K2 transceiver. The decision was made to adapt the circuit of the RF portion of the K2 amplifier to my transceiver, while adding some metering and control circuits. For those interested, details of the original Elecraft design can be found in the references [11, 12]. Schematics of the RF power amplifier can be seen Figures 31-33.

DC power enters the module at J1 and passes through P-channel MOSFET Q1, which acts as a reverse polarity protection device. The polarity protected +12V is used to power the amplifier chain, as well as being supplied to another P-channel MOSFET, Q2. Q2 allows +12V to be passed to the SWITCHED_TX+12V bus when its gate is pulled low by the /REGEN_PTT signal coming in via J2. Power from the SWITCHED_TX_+12V is regulated down to +5V and is used to provide bias to transistors in the amplifier chain as well as powering the current metering circuit. This arrangement allows the module to draw minimal current while the transceiver is not in the transmit mode.

RF excitation, which has been previously bandpass filtered by the Oscillator-Filter board, enters the RFPA module at J3. The RF signal is then amplified by Class A stages at Q3 and Q4. The amplified RF is then passed to a push-pull stage consisting of Q5 and Q6, where it is amplified to its final power level of approximately 5 watts PEP. The RF signal leaves the RFPA board via J6, and passes back to the Oscillator-Filter Board to be lowpass filtered, prior to being sent to the antenna.

The final amplifier stage DC current consumption is monitored by amplifier U2 and its associated circuitry. Current for the final amplifier stage passes through a 5 milli-ohm resistor R25, which produces a voltage drop of 5 millivolts per amp of current. The voltage drop across this resistor is amplified by differential amplifier U2, which has a fixed gain of 50, giving an output of 250 millivolts per amp of current. Opamp U4 provides a low impedance voltage reference, which is one half of the 5 volt supply voltage, or 2.5 volts. This reference voltage, VREF, is used to reference the (–) side of the meter, as well being supplied to the VREF1 and VREF2 terminals of U2. This causes the output voltage of U2 to be offset from ground by 2.5 volts. The total voltage output of U2 is represented by the following equation:

$$\text{Vout\_u2} = (\text{Ifinalamp} * 0.25) + \text{Vref}$$

Since the meter is connected between Vref and U2 output, the Vref term drops out. Therefore, the current through the meter will be:

$$\text{Imeter} = (\text{Ifinalamp} * 0.25)/(\text{R26} + \text{Rmeter})$$

Where, Vout_u2 = the voltage at U2 pin 5, Ifinalamp is the final amplifier current, Vref = 2.5 VDC, Imeter is the current flow through the meter movement and Rmeter is the internal resistance of the meter movement

The meter used in this project had a fullscale deflection of 2 mA, with a linear scale reading 0-10 units. A section of the scale between 4.5 and 5.5 units was highlighted in red. The value of R26 was chosen such that the meter deflects to within this highlighted zone during normal operation with a power output of 5 watts and a supply voltage of 12.2 volts. The final value of R26 was determined to be 165 ohms. Therefore, a final amplifier current draw of 0.94 amps results in the meter deflecting to within the red zone. Connections to the RF Power Amplifier module can be seen in Figure 34.

Construction Notes

Since the transceiver was intended to be of modular construction, to facilitate future experimentation, each of the four modules were built to the same dimensions (3.9" × 6.25") with mounting holes in identical locations. This arrangement allows the physical placement of the modules to be changed as needed, while eliminating the need to drill new mounting holes. Any future modules will follow these same guidelines, ensuring mechanical compatibility of these modules. All wiring to each of the modules was made by means of connectors, eliminating the need to unsolder any connections to remove a module for troubleshooting or modification.

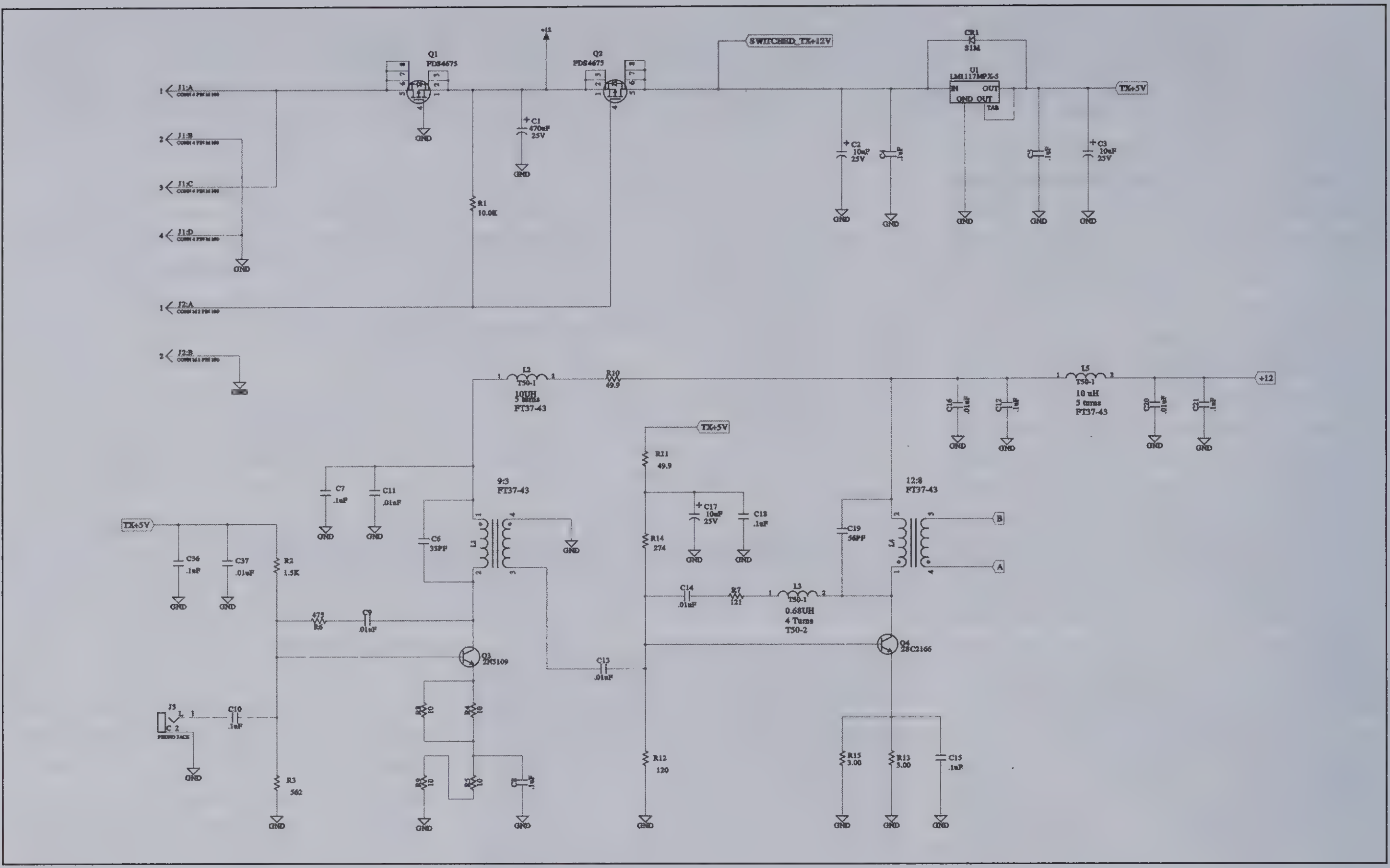


Figure 31—Circuit diagram of the predriver and driver amplifiers.

Most of my previous projects have used homebrew PCBs with varying degrees of success. This time, since access to some professional PCB layout software was available, it was decided that the PCBs would be commercially made. The boards were designed and sent to one of the discount PCB makers found on the internet. While this route was decidedly more expensive than homebrewing my own PCBs, the results were very worthwhile. Having soldermask and silkscreened component designators was truly a pleasure.

All of the PCBs were designed to maximize the use of surface mount (SMT) components. About the only through-hole parts used were connectors, potentiometers and those that could not be obtained in SMT. All of the PCBs were designed as double-sided with plated-through holes. Components were mounted only on the top side of the board as were most of the signal traces. To the maximum extent possible, the bottom sides of the boards were covered with groundplane.

All of the SMT soldering was performed by manually placing a small dab of solder cream on the component pads and then placing the component on the corresponding pads. When all of the components were placed on a given board, the board was then heated in an electric frying pan until the solder flowed. After all the SMT parts were soldered, the through hole parts were placed and soldered in the usual fashion. Remarkably good results were obtained with this method.

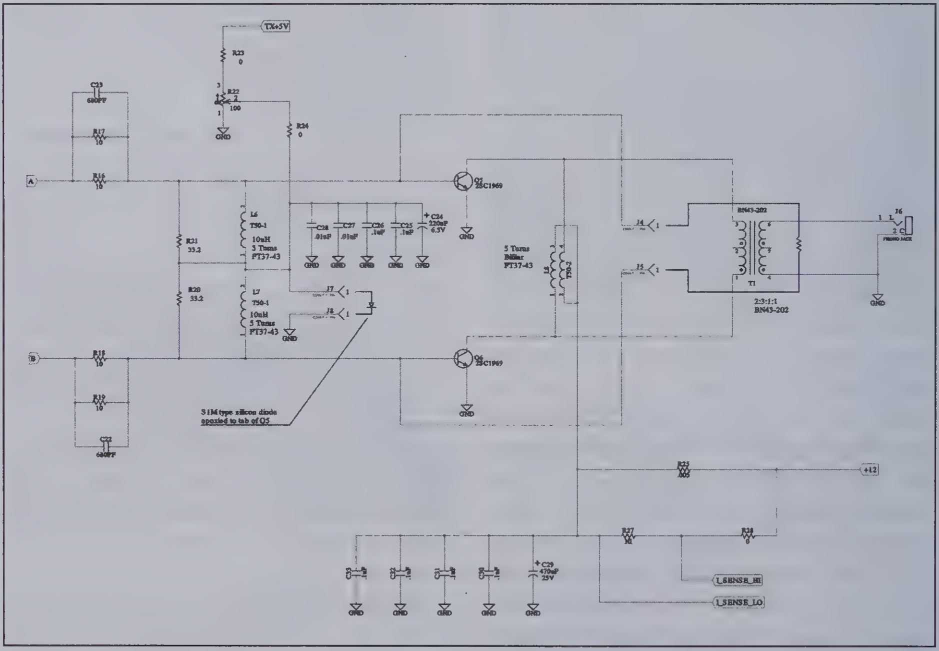
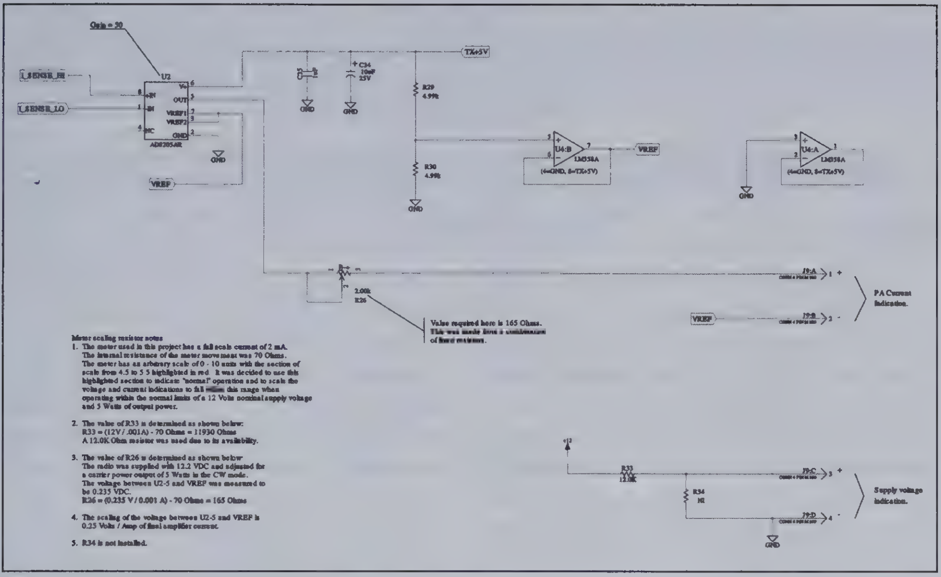


Figure 32—The final amplifier circuit.



Meter scaling resistor notes

1. The meter used in this project has a full scale current of 2 mA. The internal resistance of the meter movement was 70 Ohms. The meter has an arbitrary scale of 0 - 10 units with the section of scale from 4.5 to 5.5 highlighted in red. It was decided to use this highlighted section to indicate "normal" operation and to scale the voltage and current indications to fall [illegible] this range when operating within the normal limits of a 12 Volts nominal supply voltage and 5 Watts of output power.
2. The value of R33 is determined as shown below:
   R33 = (12V / .001A) - 70 Ohms = 11930 Ohms
   A 12.0K Ohm resistor was used due to its availability.
3. The value of R26 is determined as shown below
   The radio was supplied with 12.2 VDC and adjusted for a carrier power output of 5 Watts in the CW mode.
   The voltage between U2-5 and VREF was measured to be 0.235 VDC.
   R26 = (0.235 V / 0.001 A) - 70 Ohms = 165 Ohms
4. The scaling of the voltage between U2-5 and VREF is 0.25 Volts / Amp of final amplifier current.
5. R34 is not installed.

Figure 33—RF amplifier metering circuitry.

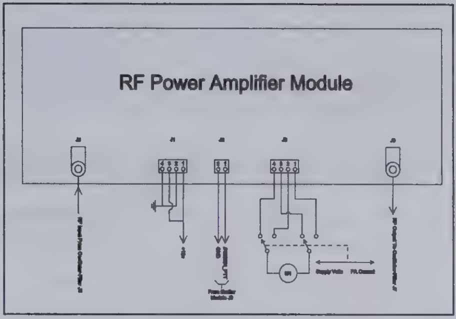


Figure 34—Module connections.

The modules were made to fit into a military surplus instrument case that was available in the junk collection. After the original instrument was removed, a new front panel was constructed from .090" aluminum (Thanks to Mike, K9GDV). A chassis, constructed from PCB material and angle aluminum, is bolted to the new front panel. All of the PCBs are attached to the chassis by means of screws and spacers.

Placement of the front panel controls was worked out by first doing the layout in AutoCAD (AutoCAD is a product of Autodesk, Inc.). This allowed the various switches, pots, etc. to be modeled and moved around on the layout until a comfortable layout was obtained. When the layout is complete, a full size (1:1) print is made that will be used for a drilling template. To use the template, simply cut the print to size, position it on the panel and tape down the edges. A centerpunch can now be used to mark the centers of the various holes to be drilled.

The lettering for the front panel was also done with AutoCAD, at the same time the rest of the layout was being done. The lettering was done on its own drawing layer, permitting it to be printed separately from the rest of the layout. A copy of the lettering layout was given to a signmaker, who made a vinyl appliqué. The appliqué covered the entire front panel and contained both the background color (black) and the lettering (white). The appliqué was simply lined up with the holes in the panel and pressed into place, giving a very professional appearance to the front panel.

All non-RF internal wiring was made with #24 PVC hookup wire. All RF internal wiring was made with some small-diameter Teflon® (a product of DuPont) coaxial cable that was available in the junkbox. No particular attention was paid to routing of the wiring, other than to keeping the wiring reasonably short. In nearly every case of a signal leaving a PCB, that signal is also paired with a corresponding ground wire, usually on an adjacent pin of its connector. On most of these wires, an attempt was made to twist the signal wire with its corresponding ground wire. From previous experience, this appears to be an effective way of reducing noise pick up from other wiring.

Additional information about the project, including Bills of Materials (BOM), PCB layouts and more can be found at my website at: http://www.qsl.net/wb9ipa/

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11. Elecraft K2 160-10 Meter SSB/CW Transceiver Owner's Manual, Revision F, January 29, 2004. Copyright 2004, Elecraft LLC (http://www.elecraft.com/manual/K2manualrevF.pdf).

12. Elecraft K2 160-10 Meter SSB/CW Transceiver Owner's Manual, Revision F, Appendix C, January 29, 2004. Copyright 2004, Elecraft LLC (http://www.elecraft.com/manual/K2_sch_blk_revF.pdf).

13. "A Direct-Conversion Phasing-type SSB Rig," *QEX* November/December, 2005, by Rod Brink.

Sixty-Foot Easy-Up Antenna Mast

Dick Pascoe—GØBPS Dick@g0bps.com

Most times when out in the field we tend to throw a piece of wire over a tree using a catapult or bow and arrow. But what happens when there aren't any trees? You could use the long fishing type pole as supplied by Kanga US, but if you want to get a whole 60-foot up in the air, this is too small.

During the 2m-contest season in the UK many years ago our local club used a 40-foot mast made up of two-alloy scaffold poles butted together with a 9-element 2-meter antenna atop. It took 10 club members to raise this into the air and get all the guy ropes in place safely.

I didn't like the way this was done and after being cajoled into taking over as contest manager for the club decided to investigate other ways. The resultant erection can be used "as is" as a stand-alone antenna for HF work or be used to carry a small beam antenna.

The great thing my Navy days taught me was about ropes, blocks and tackle and leverage. On the next contest weekend the ten good and true men of the club arrived to find the mast erected complete with a 19 element 2m beam at the top ready to go. Oh yes it wasn't a 40-footer either, but a 60-foot mast. And what confounded them all was that I had done it on my own! No, not magic but use of the previously mentioned Navy skills. [*Boy Scouts experience may also be suitable! —Ed.*]

Follow the description below and you can do it, with extreme care and by taking all the time needed to ensure nothing goes amiss you can do it alone. You will need the following equipment:

4 × 20 ft Scaffold poles, heavy-duty 2 inches diameter, and thick walled.
1 × 3 ft pole as above
Guy ropes as per the diagram
3 × jointing clamps
1 × swivel joint clamp
18 × stakes
2 × blocks and tackle
Base Plate (a small one foot square plate with a spigot on it.)
3 Guy Sleeves
Sticky tape

The first job is to place one end of the poles at the point where you intend the base to be then lay out the three of the poles in a straight line and slide the rotating guy joints on one end of each pole. Connect the three poles together using mast clamps and tighten hard.

At the joint of the each of the three poles hammer in a stake and another at the "top end." Pick up the far end of the pole, rotate it 90° and do it all again, and again and then again until all of the stakes are in the ground at set distances around the intended base position in matching order. Do not fit any antennas at this point; that comes much later.

Check the diagram. Here you will see that the three-foot pole is initially bolted to the bottom of the mast. Two stakes are used, one either side of the mast. This is to ensure that when we lift the pole does not slide along the ground.

The side guy ropes can now be fitted to the rotating guy joints and the stakes and pulled fairly tight, ensure that there is spare line to make any necessary adjustments required later. These can now be measured and fitted to the mast and the stakes that lie alongside the mast. The top guy should be 3 ft over length, the middle 2 ft and the bottom 1 ft. As we raise the mast it is intended to go past the top point so that we can tie off the other guys. Next, the last set of guys should be fitted to the rotating guy joint, but NOT the stakes yet, and left loose on the ground.

The "gin pole" should be fitted next. This is the fourth 20-ft pole, which is laid out at 90° to the mast and by using the swivel joint bolted to the mast right next to the two stakes at the base.

The three unused guys are now attached to the gin pole as per diagram 3. Spare rope is measured off and used to keep the gin pole in the upright position. The block and tackle is fitted between the end of the gin pole and the nearest stake at 180 degrees from the mast.

By pulling on the rope running through the block the whole mast will start to rise. As it lifts off the ground make any final small adjustments to ensure the mast is held straight. The block and tackle used is a combination of a single sheave and a double sheave with the tackle (rope) running through it. (See diagram.)

Pull on the rope slowly raising the mast just past the centre point. Tie off the gin pole to make it stable and you can then check the side guys for correct alignment and tightness. Two sides of the mast should now be exact. If the mast is to be used as an antenna itself then the gin pole can be removed and these guy lines tied off to their respective stakes. Fine tuning the guys as you go around.

If it is intended to use the mast to carry a beam antenna then after this check, we drop the whole thing back down to ground again. The antenna can be fitted and the feeder laid out along the ground towards the base.

It is essential that the feeder is attached to the mast at about 3-ft intervals. If left hanging too much strain is put on the top section, and we have seen a joiner break. Once fitted the whole can again be raised past the mid point and the gin pole removed.

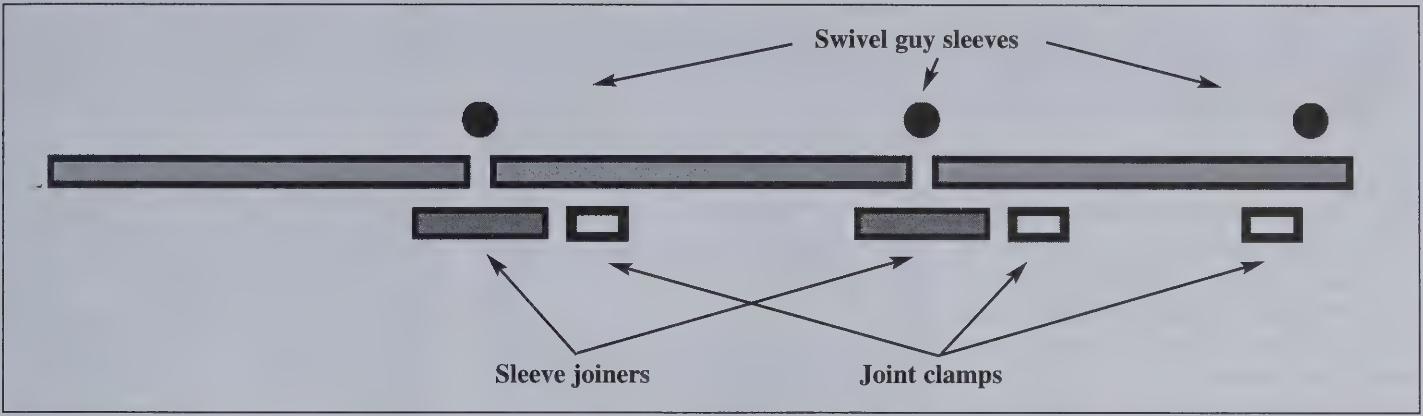
If used as a stand-alone antenna a simple plate under the base may suffice, but for better stability we used a steel plate with a small bar welded on that fitted inside the scaffold pole This stopped any lateral movement of the base and provided a pivot for the mast to rotate on. Oh yes, the 3-ft section is then raised to about 4 ft off the ground as it makes a good turning lever to rotate the antenna. Slacken off the guys on two sides and use the 3-ft section to lift the whole onto the base plate. Retighten guys before use.

Although time consuming, this can all be done by one person; I have done it!

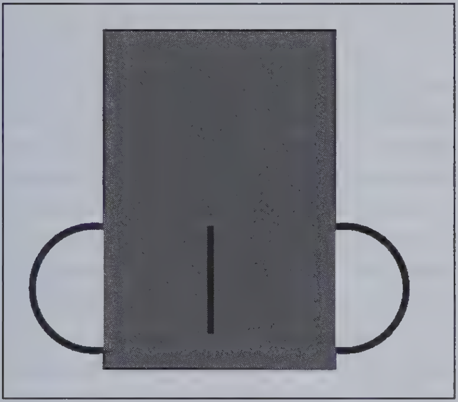
Four people are the ideal, each doing one job and working as a team. Like any job involving lifting, one person must be in overall control, and all others well away from the "drop zone" should it all collapse when it is being raised.

Taking it apart is just the reverse of this. The whole job from unloading the trailer to "on air" should take less than an hour.

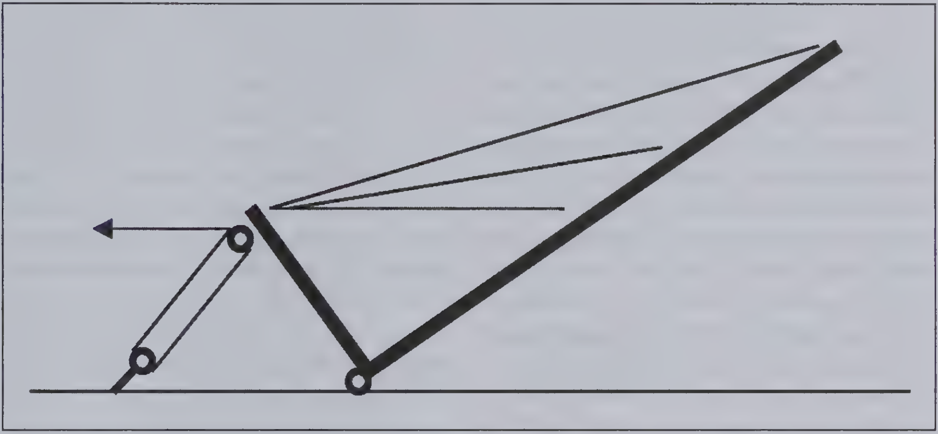
The pulley system is roped off to a "gin pole," the vertical one. The mast is horizontal. With several ropes tied off to the mast a pull on the rope will raise the mast in one piece. The large circle is the short



The three lengths of scaffold are laid out as seen. The two joiners are fitted with the guy swivels just above the joiners and the third just below the antenna. The three stakes marked as black circles are fitted as shown.



Guy sleeve detail. Steel sleeve with diameter just large enough to slide over scaffold pole. Four rings are welded onto this for guy ropes.



The pulley is tied to a stake and the top of the gin pole. The three lines ensure that the mast doesn't bend when being raised. The base of the mast is set against a stake to stop it sliding along the ground when being raised.

length that stops it all sliding along. The two stakes are hammered in deep. Side guys are fitted but not shown to stop any sideways movement. This can be used to raise any reasonable number of 20-ft poles, but I would not try more than five.

The scaffold pole in grey, the stakes in dark grey. Guys are placed from each section to the stakes. The different guys are shown on one side only for clarity.

It will be seen that if the guys are made as above the mast cannot slide sideways and will be raised in a straight line. The ones under the mast to start with should be made a fraction long so that when up the mast is up it is past the vertical for fine adjustments to be made. Do all these adjustments before putting any antennas on the mast, and make sure that any feeder is attached to the mast at regular intervals; otherwise the whole weight of the feeder is hanging from the top of the mast.

The UK's Dover Radio Club used this idea for several years with great success.

If you have any questions about this procedure email me at Dick@g0bps.com

Hendricks PFR-3 Portable Field Radio

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One of the facets of QRP operation is the ability to "take it with you." This has resulted in QRP vendors offering portable rigs that can easily be slipped into a suitcase or backpack and taken along on trips. Many times I have worked people on hiking trails or in hotel rooms that are using these portable rigs.

At FDIM2008, Hendricks QRP Kits announced its newest entry into this portable category. The PFR-3 (Portable Field Radio) is a three band self-contained transceiver kit covering 40, 30 and 20 meters. It is self-contained in that the transceiver, antenna tuner, memory keyer and 8 AA batteries are contained in one small case. External power can be supplied through a separate jack, and the user can switch between batteries and external power from a front panel switch. There is one option available. It is the PFR paddle that plugs directly into the front of the PFR-3 (see Figure 1). With the paddle, one only need add antenna and headphones to be QRV. The complete construction manual for the transceiver and the paddle is available at the Hendricks QRP Kits Web site at http://www.qrpkits.com/

Hendricks QRP Kits list the specifications as follows:

- Bands: 40 meters, 30 meters and 20 meters
- Tuning range: Full band coverage
- Mode: CW only
- Receiver MSD: 0.2 µV typical Selectivity: 300 Hz
- Receive current, no signal typical: Active, 47 mA, Idle, 34 mA
- Transmitter: 5 watts at 12 volts, all bands
- Spurs: –50 dBc maximum, all bands
- 5 to 35 wpm internal iambic keyer. Two (2) 63 character keyer memories.
- Coax or balanced line output. Built in BLT (balanced line tuner)
- Size: 7.2" long, 4.2" wide, 1.5" high (less knob height).
- Power supply voltage: 8 volts minimum, 12.5 volts maximum. 12 to 9 volts recommend.
- External power or internal battery pack

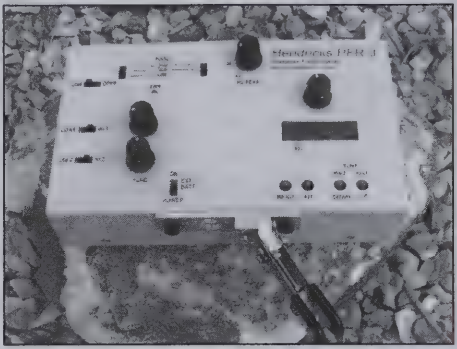

Figure 1—The PFR-3, showing the optional plug-in paddle.

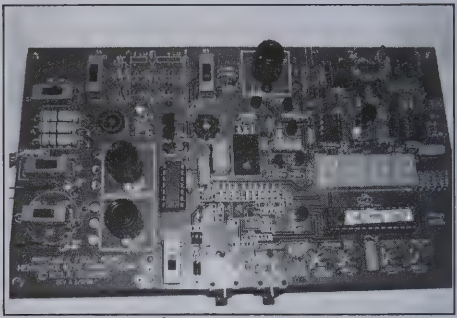

Figure 2—The pc board has closely-spaced parts in some areas, but should be buildalble with moderate experience.

The PFR is designed by Steven Weber, KD1JV, and the custom Ten Tec enclosure is from Ken Locasale, WA4MNT. The PFR-3 includes digital read out (four digits), a DDS VFO and microprocessor control. Firmware for the PFR is provided free for life. Parts for this kit are through-hole, with some pre-mounted SMT components.

Building the Kit

If working alone, the builder of this kit should have intermediate skill as some areas of the board have close component spacing (see Figure 2). Also, there are two transformers to wind that require some interpretation. However, if the builder is a beginner but has basic soldering skills and access to an Elmer, this kit will be doable and a good learning experience. There are a few components that will not mount flush to the board. These are resistors R16 through R23. The holes on the board are slightly narrower than the resistor leads when bent at 90 degrees to the body. This is a minor issue, but the builder should know in advance to mount one end of each resistor flush to the board and the opposite end slightly elevated.

The manual is well designed to aid the builder. A full-page drawing of the board is provided to help the builder in installing the parts. Each part is shown with the value in red (2.2K) and the part number in black (R21). This helps to reduce the time required to find the various locations when installing parts. Further, Hendricks divides the building into five groups. In each group, a blow up of the section from the full page drawing is provided to further help with location of parts. Also, testing of sections is done at the completion of Groups 1, 2 and 5. This allows for early success as well as trouble detection should it be needed. The groups are as follows:

Group 1—Microprocessor and Display

Care should be taken in this section when installing the LED display. It needs to go in one way with the missing pins on the LED corresponding to the missing holes on the PCB. Pay attention when mounting R16 through R23 to insure a good fit. When complete, LED operation is verified along with Tune UP, Tune DN, RIT switches and DDS operation.

Group 2—Receiver Section

Inductor L1 and transformer T1 are wound in this section. Both use number 30 wire which is thin—take care when stripping and tinning as the leads can be easily broken. When winding T1, pay attention to the diagram to insure proper phasing (Starting here, and with other inductors and transformers, an Elmer would be an asset for the beginner). When complete, you can verify electronic keyer operation, listen to 40 meters, then calibrate the DDS, and adjust the IF offset and BFO.

Groups 3 (Transmitter), 4 (Low Pass Filters) and 5 (SWR Bridge and BLT)

These groups are built as a unit, and no testing is done until Group 5 is complete. In Group 5, a picture of both T2 and T3 would help explain what is required. I recommend that when winding T3, use a bit of masking tape, and the leads of the 16 turn winding be labeled cap and ct, the leads of the 12 turn winding be labeled Hi Z, and the leads of the 6 turn winding be labeled Lo Z. This will aid with the installation of T3. At completion of Group five, transmitter operation is verified on each band. I had exactly five watts output to a dummy load on each band.

Final Assembly

Once testing is completed with Group 5, the next step is to put the PFR-3 into its custom case. Before mounting it in the case, various jacks and connectors are mounted on the case and wired to the PFR-3 pcb. The specifications list the maximum supply voltage at 12.5 volts. My bench supply measures 13.6 volts, so to insure safe operation, I added two 1N4007 diodes in series with the external power lead. These diodes drop the voltage approximately 1.6 volts, thus insuring that external supply voltage never exceeds the 12.5 volts per the specification. So, if you plan on operating from an external source above 12.5 volts, consider adding the diodes prior to mounting the pcb into the case.

With wiring from the pcb to the connectors on the case complete, it is an easy process to slide the pcb into the case. The case is remarkably well engineered and the pcb fits perfectly as if a glove.

Using the PFR-3

Using the PFR-3 on the air requires a bit of training, but it is a quick learning curve. On power up, the PFR-3 will come up on 7.030 on 40 meters, 10.110 on 30 meters and 14.060 on 20 meters. The main difference between the PFR-3 and other transceivers is frequency control. The PFR-3 uses two switches to change frequency as opposed to a single knob on a variable capacitor or POT. These switches are labeled "Tune DOWN" and "Tune UP." Tune DOWN lowers the frequency and Tune UP raises the frequency.

These tuning switches are operated best by "clicking" them to the side, rather then pushing straight down. Tuning steps are in 50 Hz increments. A momentary click of the switch will change the frequency by 50 Hz. Since the display only has 100 Hz resolution, it will take two clicks of the switch to see a change of frequency on the display. Holding one of the tuning switches closed for longer than about one second will start an auto tune mode, where the frequency will change in 100 Hz steps at a rate of about 10 steps per second, so long as the switch is held closed. When the switch is released, normal 50 Hz "one click" tuning is restored.

Changing bands involves two slide switches that are used to select the operating band. Both switches MUST be in the same band position for proper operation. The band switch, located near the top center of the cabinet, tells the processor which band you want to use and will indicate the selected band on the display for a second when the band is changed or on power up. The switch located near the top left of the cabinet is used to connect the output of the low pass filter to the antenna. If the two band switches are not in sync, there will be no signals in the receiver, and the transmitter might be damaged if you transmit at this time.

Clicking the RIT switch will activate RIT. The left-most decimal point on the display will light when you are in RIT mode. When in RIT mode, the receive frequency is changed by the tuning switches, and the transmit frequency stays were it was when RIT was activated. Clicking the RIT switch again will exit RIT mode and restore the original receive frequency.

It can be cumbersome trying to move around a band at 50 Hz per click. To help with fast frequency changes, a direct frequency entry (DFE) mode is available. This mode allows you to go directly to a specific frequency by entering it in with the paddle. Clicking and holding closed the RIT switch for longer than one second will activate this mode. The display will blank when DFE mode is enabled. The frequency you wish to go to is entered via the paddle or key, starting with the 100 kHz digit and finishing with the 100 Hz digit. As each digit is entered, it will be shown on the display and shift from right to left as additional digits are entered. If a number is not recognized, a "?" will be sent by the side tone. Once the 100 Hz digit is entered, the rig will re-tune to that frequency provide it is within the normal tuning limits of the current band. If it outside the band, the frequency at which the rig was tuned to when DFE was enabled will be restored. If you make a mistake or wish to exit the DFE mode at anytime before the 100 Hz digit is entered, you can escape by clicking any of the switches.

Other functions are available that use the "MENU" switch in combination with the paddle. These include storing a message in one of two memories; sending one of the two stored messages; changing the keyer speed; and selecting either iambic mode A or mode B.

If a monaural plug is in the paddle jack at power up (the sleeve grounds the dash input pin), the rig will power up in straight key mode. This allows using either a straight key or external keyer. While in straight key mode, none of the keyer switch functions will be available.

On the Air & Conclusions

My first time on the air with the PFR-3 was in the early afternoon on 20 meters. As I was tuning around, I came across a "small" pile up. It was John, ON4UN. It took one call to snag him! Since then, I have used the PFR-3 with my Tri-Bander, an eighty meter dipole fed with ladder line and a W3EDP end fed. I have worked into Europe, South America and Africa on all three bands using various antennas. The 300 Hz crystal filter is wide enough to allow one to tune around the bands, yet narrow enough to aid in eliminating close by signals. I have found the direct frequency and the RIT to be pluses. The versatility of the BLT tuner allows one to use any antenna configuration from coax direct, end fed against ground and balanced line. There is a built in SWR bridge using an LED as an indicator of low SWR. This is a plus, although the tuning of the BLT can be sharp and requires "slow" tuning to see the LED dim at the low SWR point.

All in all, QRPers will probably enjoy traveling with the PFR-3. It covers the three most popular amateur bands. It provides functionality useful to the QRPer. The built-in tuner allows for a wide range of antennas. The PFR-3 is available from Hendricks QRP Kits (http://www.qrpkits.com/). The PFR-3 is priced at $200.00 plus shipping cost of $20 US and $22.50 DX. The PFR Paddle is $40.00.

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The Q5 Homebrew Transmitter

Ron Watkins—KØETD
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Did you ever wonder what a "hollow-state" QRP rig would look like? KØETD has a very nice one, which derives from an ancestor almost half a century old.

The Transmitter

A tube type QRP rig? Although I'm not totally senile yet, I suppose growing up in the "hollow state" era sometimes causes clouding of my judgment. Also, you have to understand that this rig got its start in that era over 47 years ago! The current version was constructed in late 2006 to satisfy my nostalgic daydreams and to see what I could squeeze into an LMB box obtained at a recent hamfest. Figure 1 is the result.

My first QRP transmitter was a single 6AQ5 oscillator, powered with the same Burstein-Applebee "BA bargain" transformer that I installed in the present rig. I tried to duplicate the original rig, but I ran into all kinds of problems, chirps and falling out of oscillation at resonance. A friend suggested using a 6BH6 oscillator to drive the 6AQ5. Success at last! (Why the original circuit worked so well is still a mystery.) The new circuit is stable, easy to tune and essentially chirp free. Crystal control is used for simplicity. I had a few 40-meter crystals in stock and filled in some gaps with units purchased from Brian, AF4K in Florida. I do need to add 7030 kHz now that it is the "official" 40 meter QRP frequency, as my nearest crystal is 7027 kHz.

Circuit Description and Construction

Figure 2 shows the schematic for the Q5 transmitter, and Figure 3 gives you an idea of how it is laid out.

The 6BH6 oscillator is a tried and true Colpitts circuit. A VFO can be used with this circuit by simply removing the crystal, shunting the 2.5 mH cathode choke and connecting the VFO output between the control grid and ground. The output of the 6BH6 is untuned, but it has adequate drive for the 6AQ5. This adds to the stability of the final and no neutralizing is needed. The 6AQ5 operates as a straight thru Class C amplifier and is cathode keyed for CW. The output tank is a conventional PI network designed for a 50-ohm output impedance with a Q of 12. The final is loaded to 35 milliamps, which results in slightly less than 5 watts output. Filament voltage is rectified and filtered to operate a 12 vdc relay for the antenna changeover and receiver muting. Not exactly break-in, but the switch-over is accomplished reasonably quickly.

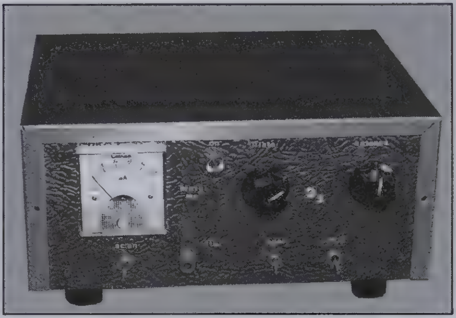

Figure 1—The Q5 hollow-state transmitter.

The rig is built on a homemade aluminum chassis, with the transformer and 6AQ5 recessed to fit in the flea market 3 1/2" h × 8" w × 6" d LMB box. The box had a few holes in the front that didn't match anything, so a small piece of thin "leather grained" aluminum was fashioned into a front panel and painted anodized bronze. The cabinet is painted a contrasting silver-gray hammertone.

Cost Analysis

From a brand new construction standpoint, this transmitter would be a little pricey to duplicate. I checked on a new equivalent power transformer; it was over $35! I think I gave $2.95 (or less) for the one I am using. Variable capacitors are also expensive, $10 to $15 each for new units. For those of you who love to raid the Ham flea markets, most everything in this rig can be easily found and for a fraction of new cost. The only new parts I purchased were the miniature switches.

Companion Receiver

After finding that the transmitter worked so well, I decided to rework an existing homebrew solid state SSB receiver to be part of a dedicated CW system.

The superheterodyne companion receiver, shown in Figure 4, has been an evolving project over the past 25 years, originally as a separate, better performance, 40-meter receiver to be used with a Swan 140 transceiver. The solid state circuitry is based on information from various industry and amateur sources. Frequency coverage is 7.0 to 7.1 MHz only.

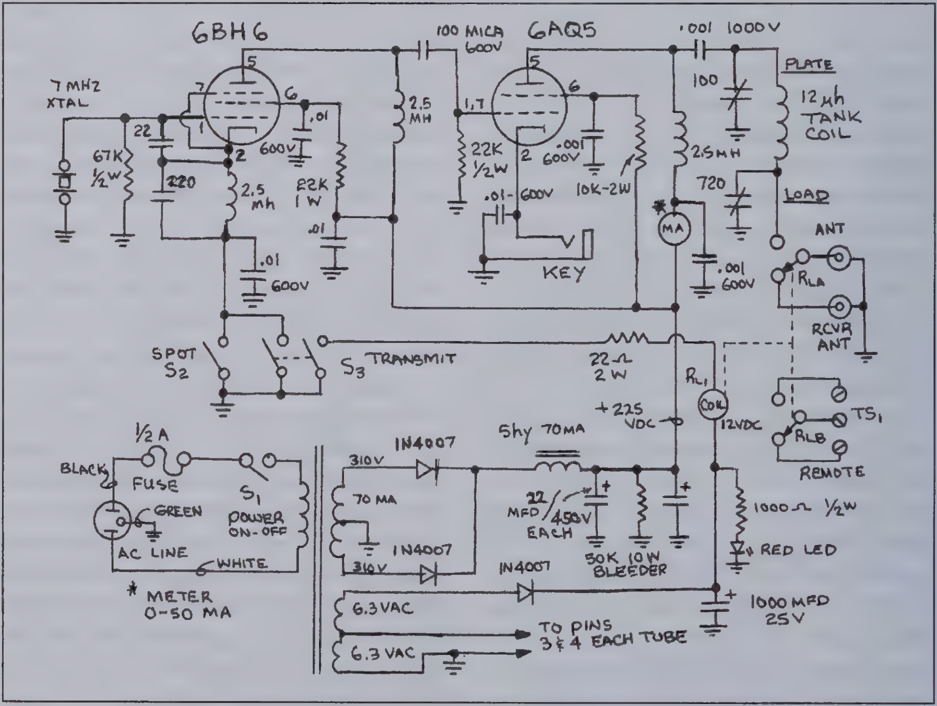

Figure 2—Schematic diagram for the Q5.

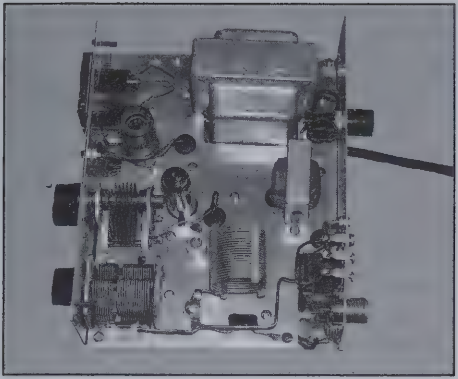

Figure 3—An inside view of the Q5.

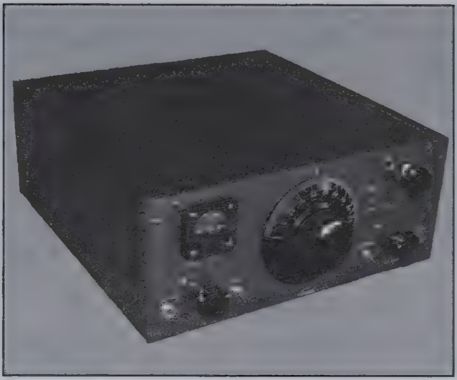

Figure 4—The companion receiver.

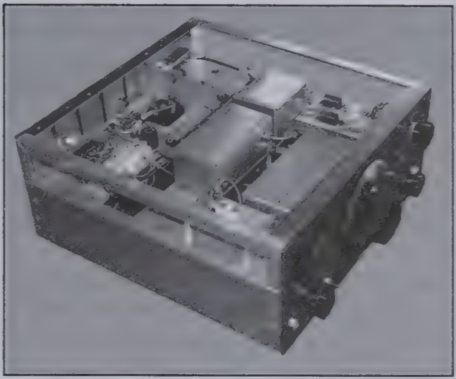

Figure 6—An inside view of the receiver.

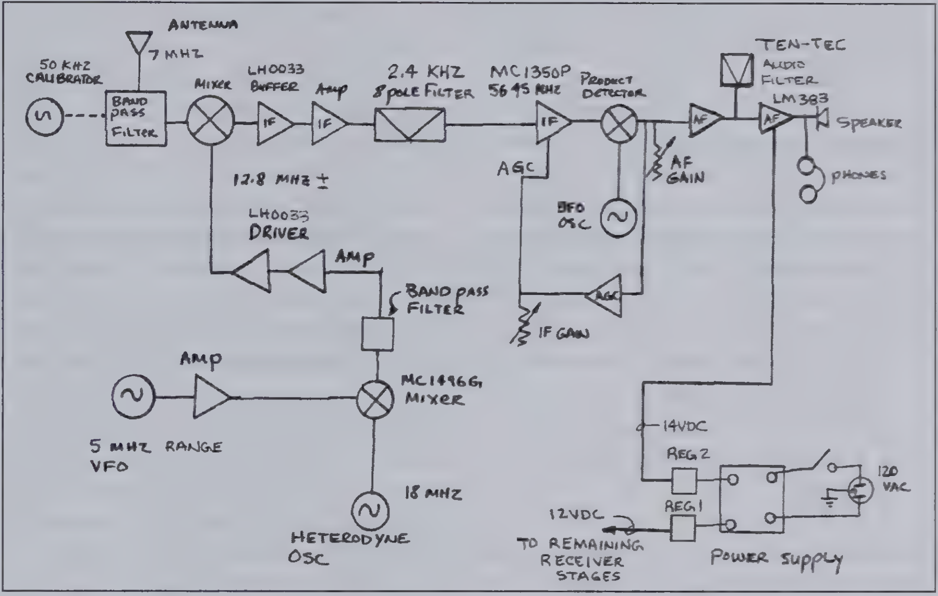

Figure 5—Receiver block diagram.

Unfortunately, I do not have a complete schematic for the receiver, as it was a developing project over so many years, but I have created a block diagram (Fig. 5). Figure 6 shows the corresponding physical layout.

The front end is an unamplified diode-ring mixer with a 7 MHz passband filter input similar to that found in the Atlas transceivers. This gives the receiver a good strong-signal handling capability. The 12 MHz local oscillator drive is synthesized by mixing the output of a 5 MHz VFO with that of an 18 MHz crystal oscillator.

The diode-ring mixer is followed by discrete transistor amplification and then by a crystal filter centered on the IF frequency of 5645 kHz. This filter is currently a 2.4 kHz bandwidth, SSB type. The filtered IF signal is further amplified approximately 60 dB using a single MC1350P IC. A product detector, implemented with a 40673 dual-gate MOSFET, produces an audio signal which is amplified by a MPF102, fed through an active audio filter from TEN-TEC, then on to an LM383 which can produce up to 8 watts of audio for headphones or external speaker. The TEN-TEC audio filter, centered on 750 Hz, provides 4 positions of selectivity, from approximately 1000 down to 100 Hz.

The receiver AGC voltage is derived from the detected audio and controls the gain of the MC1350P IF amplifier as well as driving the "S" meter circuit. A 50 kHz crystal marker, implemented as a crystal controlled multivibrator, provides a means of calibrating the 0 to 100 dial scale.

The built-in AC power supply provides +12 volts to the receiver circuitry through two regulators, but the unit can be easily modified to operate from a single 12V source, such as a battery, for portable or mobile use.

The receiver is very stable, both mechanically and electrically, and compares very well with lower cost commercial units. I am looking for a 5645 kHz, 500 Hz bandwidth IF filter to further improve its performance.

On The Air

This is where everything finally came together! I paired my new CW station with an existing 40 meter inverted V antenna. To key the transmitter, I used a trusty old Heathkit HD-1410 connected to a set of Bencher paddles.

The little 6AQ5 rig has provided me with many hours of fun operating, and I am always amazed at the good signal reports and solid contacts. I usually call CQ, as it's hard to answer someone who is using a transceiver unless they are very close to the crystal frequency. The results have been beyond my wildest expectations. I have worked and confirmed all of the 3,6,8,9 and zero call areas, 38 states total, plus Canada and Mexico, even with my somewhat sporadic operating schedule. My best DX to date is Hawaii.

Biography

I am 68 years old and a retired electrical engineer. My field was power distribution and factory lighting, with some electronics work thrown in as a sideline. I received my Novice license in 1956 and have held an Extra Class license since 1963. My main interest is AM boat anchors, along with home brewing AM and CW gear. QRP is a bit of a sideline with me, but I do enjoy the challenge. You can see more of my efforts at http://www.arizona-am.net/TUCSON/K0ETD/k0etd.html. The pictures (and text on my web site) were done by Jim Bromley, K7JEB.

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Mountain Topping

Richard Arnold—AF8X af8x@comcast.net

Most of us have read accounts of mountain-top operation in the ARS Sojourner of the Adventure Radio Society, as well as *QRP Quarterly*. What a thrill it must be to operate from a camp site located far above the surrounding terrain! A few friends and I often operate from Mount Clemens. Mount Clemens is located in Michigan, but it is far from being a mountain, in fact it isn't even a mole hill. Still, we do enjoy our outings at a local park where we set up our portable equipment and antennas.

The amount of enjoyment from operating portable is closely related to the amount of success you achieve. Aside from the rig and batteries, your antenna is going to make the difference between a waste of time and working the world. The antennas that I like to use in the field are the following:

1. The MP-1, a tunable vertical that is the easiest to deploy,
2. A half-wave end-fed wire, and
3. The mono-band delta loop.

The MP-1 (a product of Super Antennas) is a very good little antenna that works well and is easily clamped to anything available from a picnic table to just a stake in the ground. It comes complete with a set of radial wires, clamp and bracket to fit almost any situation. The antenna breaks down into small-length pieces easy to carry if hiking or biking.

The end-fed half-wave wire is a very good low cost antenna, and no feed line is used. I connect it directly to the rig with the on-board tuner or to an outboard tuner when using other rigs. The tuner is necessary to match the feed point impedance of the antenna, which is several thousand ohms, to the 50-ohm input of the radio. There are other methods of matching, but this is the simplest. I have half-wavelength wires cut for 20, 30, and 40 meters, each measured and cut using the formula 468/frequency in MHz. A counterpoise is not typically required by half-wave antennas; however, some hams have said using a counterpoise enhances its function. During my operation, I have not found this to be true. These wires are obviously mono-band antennas. If a multi-band, random length wire (sometimes incorrectly called a long wire) using an antenna tuner is preferred, it should be cut at a length that is not resonant on any band. Refer to the chart below for wire lengths that are not resonant on any band from 3.5 to 29.7 MHz.

15.0	27.5	39.5*	58.0	76.0	96.0	109.0	145.0

* Widest non-resonant range. A long wire = >1 wavelength at the operating frequency

Table 1—Non-resonant long-wire lengths for amateur bands from 3.5 to 29.7 MHz

The third antenna, and my favorite when I have the time and energy along with a support up about 20 feet, is the full-wave delta loop. As this is a full wavelength, I selected 20 meters as the band of choice, making the antenna small enough to easily handle. The loop is directional and polarization is either vertical or horizontal depending on the feed point location. This antenna is very quiet compared with vertical antennas. It takes up very little room in my carry bag and is easy to erect. Made of flexible wire, it can be wound up into a small package and needs only one support, and it is resonant on 14.060 MHz without the use of a tuner.

I used the formula: 1005 / freq in MHz to find the full length of the loop.

1005 / 14.060 = 71.47 feet (71' 6")
71.47 / 3 = 23.82 feet per leg. (23'-10")

The impedance of the delta loop is about 100 ohms. To match it to a 50-ohm feed I use a quarter-wave 75-ohm coax Q section. To find the impedance needed for the Q section you need to multiply the square root of the antenna impedance times the feed line impedance (100 × 50 = 5000) × $\sqrt{5000}$ = 70.7.

73-ohm RG 59 is a close match to the calculated 70.7 ohms for the Q section. The Q section quarter-wavelength is found by the formula:

246 × Velocity factor / Freq.
(246 × .66 / 14.060 = 11.54 feet)

Any length 50-ohm coax can be connected between the Q section and the transceiver.

Once the Q section is connected to the two free ends of the loop wire, three insulators made of 1/4-inch wide slices of 1/2-inch PVC tubing are attached at 23' 10? spacing. The insulators are attached by pushing a loop of wire through the hole and then pulling the insulator through the loop, making them easily movable, and in my case, positioned so that the feed point is located one quarter-wavelength from the apex, which gives the antenna vertical polarization. If horizontal polarization is desired, it can be accomplished by simply moving the insulators so that the feed point is on the horizontal portion of the antenna. This antenna is easily hung by throwing the halyard over a tree limb and staking the corner supporting lines to the ground. This antenna has a very good signal to noise ratio, desirable in any antenna system, and the directional characteristics of this antenna are opposite to the small loop antennas, in that the maximum radiation is perpendicular to the plane of the loop.

The wire I use for the antenna is #22 stranded alarm wire from Radio Shack (278-862). It comes as two conductors twisted and wound on a spool. I reeled off the required amount and secured the ends in a vise, and then chucked up the other ends in a cordless drill and power-unwound the twisted pair until I had two separate wires. The wire is lightweight and flexible and can be wound up without kinking. I have also used this wire for portable dipoles.

Even if you are not near a mountain, operating from a local park or school yard can be a lot of fun and will prepare you in case you ever have a chance to practice your portable techniques.

About the Author

Dick Arnold, AF8X, is a member of the Utica Shelby Emergency Communication Association. Some of the information contained in this article has previously been published in the club's newsletter, the USECA Express. ●●

Antennas 101: How Modeling Programs Work

Gary Breed—K9AY k9ay@k9ay.com

Many of us use antenna modeling software to evaluate existing antennas, and to explore how new antennas might work before we build them. As long as he follows the rules spelled out in the instruction manual, even a beginner can get realistic results for most common antennas. With experience, we get more confident about those results, especially if we build real antennas and compare them to the modeled results. Now we can have fun looking at more interesting designs!

But have you ever wondered how the software knows what to do? Without going into the details of Maxwell's equations, displacement currents, eigenvalues and boundary conditions, I'll try to explain what's going on inside the CPU of your computer when it's figuring out how your new dipole will work at 14.060 MHz.

Breaking Down a Big Job into Little Pieces

To begin, let's look at a dipole. We know that the ends won't have any current, since there is no place for it to flow. And antenna scientists have determined, by math and measurements, that the magnitude of the current is maximum at the center and falls off to zero on the ends according to a sine wave function (Figure 1).

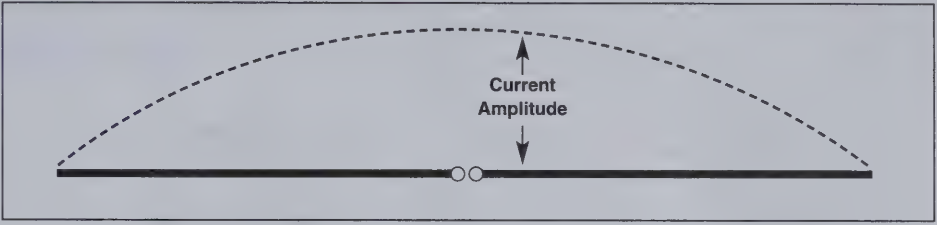

Figure 1—Amplitude of the current along a dipole follows a sine wave shape.

What the software does is divide the antenna into many segments, calculating the magnitude and phase of radiation from each segment—creating a new version of your antenna that is now large number of little antennas (Figure 2). An important rule in using modeling software is choosing an appropriate number of segments. This establishes how finely divided the "little antennas" will be. Each segment has its own amplitude and a phase shift relative to the feedpoint.

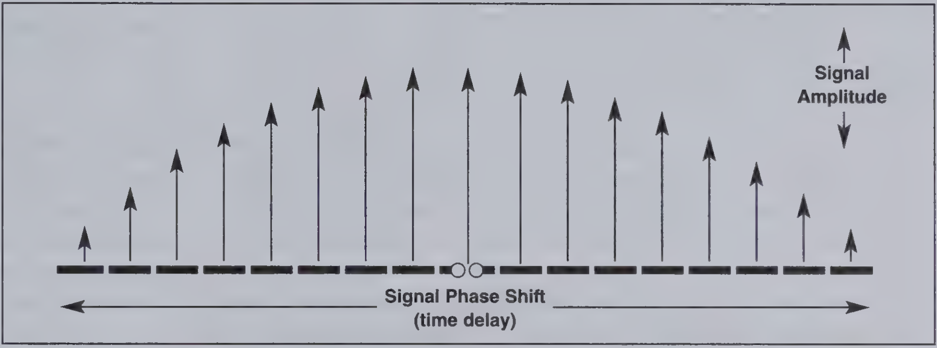

Figure 2—The software (with your guidance) divides the dipole into small segments and calculates the radiation from each segment, like a bunch of little antennas.

Finally, all those little antennas are combined like phased arrays—with a separate calculation at every azimuth/elevation bearing you have specified. For example, to obtain the antenna pattern at one elevation, in 1 degree increments of azimuth, requires 360 calculations.

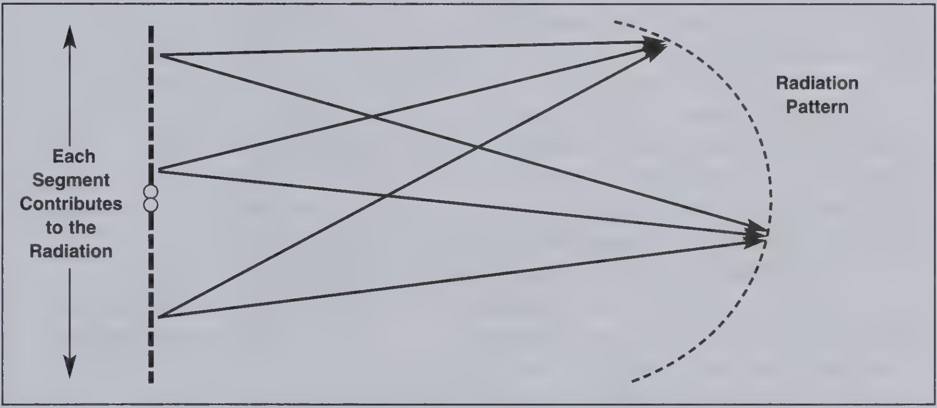

Figure 3—Finally, radiation from all of the segments is combined, over and over again, with separate computations for each azimuth and elevation direction.

If your antenna is being modeled above ground, the calculations are essentially tripled. Each segment has not only direct radiation, but we must compute the radiation toward the ground and the reflected radiation to the observation point. This process also requires a separate calculation of the losses due to the effects of ground.

Serious Math Inside!

The calculation of the radiation and the feedpoint impedance is done with the "black magic" of Maxwell's equations, aided by some clever mathematical approximations and shorcuts that make it possible to reduce their computation from infinity down to a more reasonable time scale—while keeping the results accurate!

While the heavy lifting is performed inside the computer, you still need to figure out the "big picture" information, such as feedpoint current and phase plus, of course, the physical dimensions and sizes of the antenna's conductors. Fortunately, these things are much easier to work with than multiple complex integral equations!

So, next time you check out an antenna in EZNEC or other modeling program, remember that some really smart people have worked for more than 150 years to help show you how it behaves!

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QRP Contests

Jeff Hetherington—VA3JFF contest@qrparci.org

MARK YOUR CALENDARS!

Silent Key Memorial Sprint
August 16, 2008

End of Summer Digital Sprint
September 14, 2008

Fall QSO Party
October 18-19, 2008

Top Band Sprint
December 4, 2008

Holiday Spirits Homebrew Sprint
December 21, 2008

It's Summertime, Summertime, Sum-Sum-Summertime! The sun is shining bright, the trees are swaying in the breeze and we're heading outside in droves. Only problem is that radio is an indoor hobby. Guess we'll have to wait until it rains …

Of course, those of us in the know realize that the summertime can be among the most entertaining times for radio operators like us. Get those radios outside portable, throw some wires into the trees and have some fun while you work on your tan! As I write this, the ARRL Field Day (and our own milliWatt Field Day) activities are coming up quickly this weekend. We ALWAYS get outside in large numbers for this event and show the world what we can do with our QRP signals. But do you stop your outdoor operating after the FD fun ends?

Many of our members operate portable outside year round. Bob MacKenzie, VA3RKM, can be seen in the picture operating from Ottawa, Ontario, under a couple feet of snow and sub-freezing temperatures, and he is not alone. Portable operating has become a growth segment in the QRP market and there are several options for operators that want to give it a try. We even give 5,000 bonus points in many QRP-ARCI contests for operating in a portable set-up, and we see more people take advantage of that bonus in every passing contest.

Let's take a brief looks at what is available to the QRP portable operator. While this is not intended to be an all-inclusive look, nor an in-depth review, it will give a quick summary of what's available to get you started. The web links will take you to the information about some of the more popular products.

Bob Mackenzie, VA3RKM.

Radios

Yaesu FT817:
    www.yaesu.com
Icom IC703:
    www.icomamerica.com
Elecraft KX1:
    www.elecraft.com
QRP Kits PFR-3:
    www.qrpkits.com
KD1JV ATS-3 Series:
    kd1jv.qrpradio. com
Small Wonder Labs Monobanders:
    www.smallwonderlabs.com

Antennas

Super Antennas:
    www.superantennas.com
Pacific Antennas:
    www.pacificantenna.com
Buddipole:
    www.buddipole.com
Hex Beam:
    www.hexbeam.com
Hamstick Antennas:
    www.hamstick.com
Tarheel Mobile Antennas:
    www.tarheelantennas.com
Crappie Antenna:
    www.amqrp.org/projects/crappie/crappie.htm
VA3JFF's Fishing Pole Vertical:
    www3.sympatico.ca/wjhetherington/antenna.htm
    Plus—Resonant verticals, G5RV, Doublets, Resonant Dipoles, Slopers

As for contest results from the past quarter, the HF Grid Square Sprint proved once again to be a popular and enjoyable sprint. This year's running found our first Rover entrant as Paul Stroud, AA4XX, operated from 4 different grid squares while operating mobile. Looks like we'll need a new rover category next year! The eventual winner was Bob Patten, N4BP, with 67,725 points holding off Arnold Olean, K0ZK, who scored 37,408 and Paul Stroud, AA4XX, who utilized the rover strategy for a third place finish with 26,700 points.

The Spring QSO Party brought out lots of participants, and once again Bob Patten, N4BP, came out on top for the sweep this quarter. His total of 816,340 points easily outdistanced second place Bob Nash, VE3KZ, and his 439,964 points. Rounding out the top five were Dick Housden, W0NTA, with 362,670 points; Doug Ferris, VA3DF, with 332,416 points; and Rick Lloyd, AA4W, with 330,925 points. The Team Competition was something to behold! Traditional powerhouse teams The CCO Beaver Boys and the Aluminum Kings went toe-to-toe, and the Aluminum Kings emerged with 1,270,409 points edging out the CCO Beaver Boys team total of 1,222,004. Congratulations to the Aluminum Kings: Bob Patten, N4BP; Jim Lageson, N0UR; and Frank Scutch, W4FMS. Putting up the good fight in second place for the CCO Beaver Boys was Bob Nash, VE3KZ; Doug Ferris, VA3DF; Art Tolda, VE3UTT; Robert MacKenzie, VA3RKM; and Pat Byers, VE3EUR. MI-

Spring QSO Party Results

Call	QTH	Score	QSOs	PWR	PTS	SPC	Bands	MULT	In Chair	Rig + Ant
N4BP	FL	816340	335	< 5W	1372	85	ALL	7		K3 + A4S, 40/80 Armadillo Dipole, 160m Inverted L
VE3KZ	ON	439964	187	< 5W	827	76	ALL	7		IC706MKIIG + 20m 4ele yagi, 40m vertica
W0NTA	CO	362670	187	< 5W	785	66	ALL	7	21:33	K2 + Force 12 Sigma 40XKR
VA3DF	ON	332416	170	< 5W	742	64	ALL	7		K2
AA4W	FL	330925	182	< 5W	775	61	ALL	7	12:30	FT817 + 15/20 2 el yagi @ 40ft, 40m dipole
VE3UTT	ON	287168		< 5W			ALL	7		
N0UR	MN	263494	152	< 5W	649	58	ALL	7		
K3HX	PA	257152	164	< 5W	656	56	ALL	7	17:43	Orion I
W8TM	OH	244188	168	< 5W	684	51	20/40	7	15:30	K1 + 40m inv vee
K3WW	PA	231014		< 5W	569	58	ALL	7		K3 + SteppIR, Bencher Skyhawk, 402CD, 80m vert.
K4KSR	VA	225400	129	< 5W	575	56	ALL	7	16:40	K1 + 40m Windom, 80m Vertical
NG7Z	WA	207522	137	< 5W	549	54	ALL	7		IC756 + Force 12 C3, Cushcraft 40-2CD 2 ele
KN7T	WA	198485		< 5W	535	53	ALL	7	13:51	IC765 + Hexbeam, double bazooka
W4FMS	MI	190575	111	< 5W	495	55	ALL	7		
WA4DOU	NC	165200	104	< 5W	472	50	ALL	7	7:06	FT-897D + C3SS and Vertical
K8DD	MI	160160	83	< 1W	364	44	ALL	10		K3 and K2 + 80m dipole, 40m dipole, triband beam
VA3RKM	ON	156576		< 5W	466	48	ALL	7		K2 + Verticals, dipole, 160m wire
KD2JC	NJ	153314	107	< 5W	466	47	ALL	7	16:00	K2 + 40m loop, G5RV
WB3AAL	PA	149200	80	< 1W	373	40	ALL	10	14:50	K2 + HF9V, triband beam
N4HAY	NC	140448		< 5W	418	48	ALL	7		Argonaut V + TH6, 40m wirebeam, 80m & 160m dipole
WQ8RP	MI	131838	106	< 5W	438	43	ALL	7	10:00	Drake TR5
W1PID	NH	131537	106	< 5W	437	43	ALL	7	3:00	IC703 / ATS
W0UFO	MN	122038	86	< 5W	379	46	ALL	7		K2 + 40m inv v, 20m TA-33, 80m 120ft zepp
K7IA	NM	114750	48	< 250mW	225	34	ALL	15		K3 + 4 el SteppIR Yagi, 40m SteppIR Vertical, 80m vee
N0EVH	MO	113176		< 5W	376	43	ALL	7	14:01	K2 + 135 ft doublet
W3PO	MD	101790	51	< 250mW	234	29	ALL	15		FT817 + Veebeam
N1RX	NH	101460	57	< 1W	267	38	ALL	10		K3 + G5RV
WD7Y	NV	94430	71	< 5W	355	38	ALL	7	10:30	Ten Tec Orion 2 + Dipole and Vertical
K2JT	NJ	93500	58	< 1W	275	34	ALL	10	6:00	Sierra + Dipole
K0PC	MN	87780		< 5W	330	38	ALL	7		
NZ8J	OH	81844		< 5W	316	37	ALL	7	18:00	IC756 Pro III + Zepp and Tribander
W3TS	PA	73500	52	< 5W	245	30	ALL	10		Ten Tec Orion + 80/40 inv vee, 20m 2 el yagi
W4DU	GA	72520		< 5W	280	37	ALL	7	16:21	Multipig + 80m dipole, triband beam
W5TVW	LA	72086		< 5W	271	38	20/40	7	4:41	K1 + 135ft dipole
N6DIT	CA	64050		< 5W	305	30	20/40	7		
K8DDB	MI	62370		< 5W	270	33	ALL	7	8:00	K1 + Triband Beam and 40m dipole
KS4DU	ID	53088	54	< 5W	237	32	20/40	7		
K4PBY	FL	52325		< 5W	299	25	20	7	5:13	Argonaut V + Inv Vee
K5GQ	TX	41825		< 5W	239	25	20	7	2:37	K2 + TH7DXX at 40ft
W2JEK	NJ	35525	43	< 5W	203	25	ALL	7	4:30	FT840 + 20m gnd plane, 40m dipole, 80m end fed
KM3D	PA	33124	40	< 5W	182	26	ALL	7	8:00	
NU7T	NV	31080		< 5W	222	20	20	7	5:31	Orion II + Mosley TA33jr

(cont. on next page)

QRPers took third place with 292,138 points, EPA QRPers were fourth with 182,324 points, and the Knightlites round out the team scoring with 164,115 points.

Until next time, keep your power down and your QSO rates up.

—73/72, Jeff, VA3JFF

Spring QSO Party Soapbox—

Propagation was rather poor for this one. From SFL, we had one brief Sat opening on 15m, nothing on Sunday. All day Sunday I was plagued with noise from a storm stalled just to our west. Following the contest, I took a two mile walk and was treated to a spectacular light show. An RTTY contest ran consecutively with the Party, but I was pleased to work quite a few QRPers around 7030—seems like the word of the new ARCI recommended frequency is finally getting out.—**N4BP**

This was my best score in an ARCI

Spring QSO Party Top 5 Results

N4BP	816,340	Bob Patten
VE3KZ	439,964	Bob Nash
W0NTA	362,670	Dick Housden
VA3DF	332,416	Doug Ferris
AA4W	330,925	Rick Lloyd

Spring QSO Party Results (cont.)

Call	QTH	Score	QSOs	PWR	PTS	SPC	Bands	MULT	In Chair	Rig + Ant
WA5RML	TX	30030		< 5W	195	22	20/40	7	7:01	Argonaut V + 40m dipole, 20m vertical
W1SOC	FL	23800	40	< 5W	170	20	20	7		K3 + A4S
AB4PP	NC	23667		< 5W	161	21	ALL	7		TS440S + Carolina Windom
WA8REI	MI	23667	34	< 5W	161	21	ALL	7		FT817 + Vertical, 80m dipole
K4KJP	FL	22050	30	< 5W	150	21	20/40	7	2:30	K2 + 40m dipole and TA33JR
AI2T	NY	21090	24	< 1W	111	19	ALL	10	3:42	K1-4, HW8 + Random Long wire at 20ft
N9AMW	WI	18228	26	< 5W	124	21	ALL	7		FT817 + 3ele yagi, vertical, windom
K8UPR	OH	18221	28	< 5W	137	19	ALL	7	6:00	Ten Tec Argonaut V + Cushcraft R8
KB5JO	TX	17024		< 5W	152	16	ALL	7		K1 + Extended Double Zepp
KK5NA	TX	15960	34	< 5W	152	15	ALL	7	19:00	K2
AA5TB	TX	14161		< 5W	119	17	ALL	7	16:13	FT897 + Inverted L 20m Long
WD8DIN	NC	13447		< 5W	113	17	20/40	7	0:51	Omni VI + Loop
K4UK	VA	12971	23	< 5W	109	17	20/40	7	2:34	
KN1H	NH	12544	23	< 5W	112	16	20/40	7		FT817
K3MD	PA	11900		< 5W	100	17	ALL	7	9:20	Argonaut V
K4LNN	FL	10780		< 5W	110	14	ALL	7	5:16	FT857D + Inverted V
WA3GYW	MD	10304	21	< 5W	92	16	ALL	7	1:30	IC718
WA3WAW	PA	10050	14	< 250mW	67	10	20/40	15	3:45	K2 + dipoles
K0LWV	MO	9604	22	< 5W	98	14	20/40	7	8:00	IC718 + Longwire vee beam up 40 ft
VA3CBE	ON	7410	12	< 1W	57	13	20	10		IC703 + Ground Mount Vertical
W8IM	FL	6664	16	< 5W	68	14	ALL	7	3:00	IC703 + Inverted Vee, Doublet
VE3EUR	ON	5880	14	< 5W	70	12	ALL	7	3:00	NC2030, IC703
W5USJ	TX	5775	15	< 5W	75	11	20	7		FT817/FT847 + 88ft EDZ
WB0SMZ	KS	5740	17	< 5W	82	10	ALL	7	3:30	TS140S, Rockbender Transmitter + Butternut Vertical
W5TB	TX	5698	16	< 5W	74	11	20	7		
WB1HGA	MA	5355	20	< 5W	85	9	20	7		Ten Tec Argonaut V
KJ4IC	NC	4900	14	< 5W	70	10	ALL	7		FT950 + 1/2 G5RV
W0RSP	AZ	4543		< 5W	59	11	20/40	7	3:01	KX1 + 135ft End Fed
AB8FJ	OH	4389	12	< 5W	57	11	ALL	7		Ten-Tec Argo II + End-Fed Random Wire
N0EAX	MO	3920	11	< 1W	49	8	40	10		OHR 100A + Inverted V
KD2MU	NY	3591	12	< 5W	57	9	ALL	7	6:00	IC703
KD2MX	NJ	2450	10	< 5W	50	7	40/80	7	1:00	FT897 + 350ft longwire
WA9PWP	WI	2296	10	< 5W	41	8	20	7	1:00	IC756 Pro II + Carolina Windom 80
KF4UCC	VA	2100	10	< 5W	50	6	20	7		
K4BAI	GA	1764	9	< 5W	42	6	40	7		FT1000MP + dipole, inverted vee
KC2LYQ	NY	1435	10	< 5W	41	5	40	7		
W5ESE	TX	1365	9	< 5W	39	5	20	7		
WA1WQG	CT	1225	6	< 5W	35	5	40	7	2:53	OHR 100A + OCF Dipole
NG2T	NY	1200	6	< 1W	24	5	ALL	10		Rockmite + G5RV
VE5BCS	SK	1092	7	< 5W	26	6	20	7		HW8 + 2 Element Quad
RW3AI		420	6	< 5W	15	4	20	7		IC7800 + CP6
KI6OFN	CA	357	4	< 5W	17	3	40	7		K1 + End Fed Half Wave in Inverted-L
GM4XQJ		315	3	< 5W	15	3	20	7		K2 + TH3 Triband at 50ft
KC0UZA	MO	210	3	< 5W	15	2	ALL	7		K2 + G5RV
KU8H	MI	140	2	< 5W	10	2	40	7		Kenwood 599 Twins
K6CSL	CA	Checklog	3	> 5W	12	3	20/40	1		

event since 2005. Back then I had 15 DX contacts in this Spring contest. Remember sunspots!—**VE3KZ**

I got a late start this year. Missed the first six hours or so of the contest. 20 and 40 seemed active on Saturday, but very slow on Sunday. Lots of fun anyway. See you in the Fall.—**W0NTA**

Crazy Prop—**K4KSR**

For some reason, I just couldn't seem to get motivated this time. No DX heard/worked except for WP4DQK. I'll look forward to the Fall Party. Thanks to all for the QSOs.—**WA4DOU**

More activity on 160 and 15m would be good. Not the best conditions, but things should improve soon. Always a lot of fun to work other QRPers!—**VA3RKM**

Nice weekend for QRP. Too bad 15 and 10 weren't open. Here's hoping it will be in the near future.—**KD2JC**

Had a lot of fun. Received good reports while running 900mW. Fun contest just wish there was more participation on

The QRP-ARCI Contest Championship

The QRP-ARCI Contest Championship has been created in order to generate interest and participation among QRP operators in the contests sponsored by the QRP Amateur Radio Club International.

The QRP-ARCI Contest Championship (QCC) is operated concurrently with the regular contest offerings of the QRP-ARCI. Each operator that enters any of the contests listed below is automatically entered in the QCC. Please submit your entries to the below contests, no matter how small they may seem.

Eligible Contests: For 2008, the following 10 contests sponsored by QRP-ARCI will be eligible for the QCC. All contests count equally.

- VHF Contest
- Winter Fireside SSB Sprint
- HF Grid Square Sprint
- Spring QSO Party
- Hootowl Sprint
- Summer Homebrew Sprint
- Silent Key Memorial Sprint
- End of Summer Digital Sprint
- Fall QSO Party
- Holiday Spirits Homebrew Sprint

Scoring: Scoring for the QCC will be taken from the published results for each of the contests. The station placing first in each contest will receive a number of points equal to the average number of entrants in all of the QCC eligible contests from 2006. For the 2008 running of the QCC this number is 38. The station that places second will receive one less point, and so on, until either 1 point is reached, or the last entrant in the particular contest being scored is reached, whichever comes first. After that, zero points will be awarded for any additional entrants.

The final scores for the QCC will be the sum of the best six scores for each entrant. To be eligible for an award, an operator must enter at least three contests.

Awards: The person that is crowned as the QRP-ARCI Contest Championship Winner will be awarded a plaque suitable for hanging on their shack wall. Additional certificates will be awarded to the top scoring entrants in the championship.

15m.—**WB3AAL**

Really tough condx but had a good time with the Knightlites gang.—**N4HAY**

A bit slow contest but fun working a fellow with 200 mW on 40 meters in the evening.—**WQ8RP**

I dabbled … but I had fun. The highlight was working George GM3OXX on 20m while on a hike. George was running 1W and I was running 4W with an ATS and a 33ft wire.—**W1PID**

I was hoping for more operating time as the bands seemed fairly good, but other priorities interfered.—**W0UFO**

Ran Spring ARCI event from Knob Noster State Park this year, K2 at 5 watts to a 135 foot doublet in the oak trees. Bands just so so. Worked CA on 15 meters and one notable 100mW station in NV. Thanks for the event.—**N0EVH**

If RTTY didn't exist it would almost be a perfect world. All it takes is a touch of a button to QRM a QSO.—**WD7Y**

Lots of other contests on 40m. Tried 160 and 15, no luck.—**K2JT**

Terrible conditions here in Ohio, Lots of QRN Not many strong signals, almost everyone was a struggle.—**NZ8J**

I had a little time Sunday for some "hit and run" contest participation ("hit" the bands for a few quick QSOs then "run" back to the chores before the XYL noticed that I was not getting my jobs finished). After I got into it a little on Sunday I wish I had done some "Hit and Run" on Saturday between chores.—**W3TS**

Good to see more activity at 7030 away from the RTTY.—**W4DU**

Didn't have a lot of time to operate. Nothing heard on 15 meters. Active on 20/40 meters. Did not operate 80 as very high QRN Saturday night. First QRP contest since my XYL had her stroke last year. Hope to join in more in the future. Band conditions seemed fair.—**W5TVW**

Gud Contest!—**N6DIT**

I spent 8 hours on and off. Mostly working search and pounce. Thanks to everybody for a great time.—**K8DDB**

Operated 20m for a few hours each day. Band condx were good with many strong sigs.—**N4PBY**

Enjoyed the event but discovered just how much work my old ham station needs—was my first operating event since the late 90's <grin>.—**KM3D**

A heartbreaker. Murphy showed up—severe back pain, a storm had damaged my main 20-10m vertical; Had to use a Buddipole at 8ft in the backyard for 20m on Saturday; Fixed vertical for Sunday—but not much activity; Didn't get to operate 40m Saturday evening; Also, propagation really seemed bad and QRN seemed high. Most QSOs were right at the noise level. See you in the fall!—**WA5RML**

I started out at home because I was sick for the last two days. I had intended on operating from the Knightlites site with the rest of the crew. That did not pan out for me. I got sicker and eventually just had to go to bed. Meds did not help either. They made me more sleepy. This was the first Spring ARCI event I missed in years. I did notice a lot less ops on the air, or maybe it was just all the interference from the rtty down to .29 on 40 and not much heard on 20. 15 and 10 I never heard a thing. 80 was quiet and not very productive when I could get on. Hope to be well for the next event and chat with some of you then.—**AB4PP**

Fun contest even with poor condx. Most folks running a full 5 watts to make up for it. Best DX from FLA was Jim W1FMR in NH who was running a Rockmite and was 559! That is the QRP Spirit!—**K4KJP**

Just a few hours with one watt output as measured by Oak Hills WM-2. Lots of Fun!—**AI2T**

My first ARCI Contest.—**N9AMW**

Great Contest. Lots of calls I have not worked before.—**KK5NA**

Conditions must have been poor as very few signals heard. Of course the QCWA Spring QSO Party and the Missouri QSO Party and the EA RTTY Contest were on the same weekend. Sure wish the RTTY folks would not operate as

Grid Square Sprint Results

Call	QTH	Score	QSOs	PWR	PTS	Bands	Grids	MULT	Bonus	Rig + Ant
N4BP	FL	67725	50	< 5W	225	20	43	7	0	K3 + Cushcraft A4S
K0ZK	ME	37408	43	< 5W	167	20/40	32	7	0	K3 + 30ft miliary mast on roof
AA4XX/m	NC	26700		< 5W	124	20/40	25	7	5000	Argonaut V + Hustler RM-20
AA2YV	NY	24948	33	< 5W	132	20/40	27	7	0	K1 + 40m dipole
K3HX	PA	24500	34	< 5W	125	40	28	7	0	Orion I + Homebrew trap dipole
AI2T	NY	19803	27	< 5W	123	20/40	23	7	0	K1 + Longwire, dipole
K9FO	IL	18354	27	< 5W	114	20/40	23	7	0	Ten Tec Orion + 40 Dipole - 20 Dipole
NE5DL	TX	17766	23	< 5W	141	20	18	7	0	K3 + Hexbeam
AA4W	FL	16844		< 5W	94	ALL	18	7	5000	
AE5X	OK	15976	19	< 5W	98	20	16	7	5000	KX1 + 20m Ground Plane
VE3MGY	ON	14960	20	< 1W	88	20/40	17	10	0	
VA3SIE/pm	ON	11762	15	< 5W	69	20/40	14	7	5000	KX1 + 32ft wire on 20ft fishing pole
KD2JC	NJ	10472	20	< 5W	88	20/40	17	7	0	K2 + 40m loop, G5RV
K0LWV	MO	9408	18	< 5W	84	20	16	7	0	FT757GXII + Vee beam
KC4ABC	FL	8640		< 5W	52	20	10	7	5000	IC7000 + HVT-4000 Vertical
AA2JZ	FL	8624	16	< 5W	77	20/40	16	7	0	IC7000
N6DIT	CA	7849	11	< 5W	37	20/40	11	7	5000	KX1 + Mil Spec Mobile modified to truck
W4RYW	AL	6279	15	< 5W	69	20/40	13	7	0	FT847 + Lader Line to 160m Loop
VA3RKM	ON	5875	5	< 5W	25	20/40	5	7	5000	K2 + 30ft wire
AA5TB	TX	5875	5	< 5W	25	20/40	5	7	5000	MFJ-9020, SW-40+ + Dipole, EFHW
N1LU/4	FL	5208	13	< 5W	62	20	12	7	0	
K6TTT	CA	4235	11	< 5W	55	20	11	7	0	SWL-20 + Windom
K4JSI	MD	4032	12	< 5W	48	20/40	12	7	0	K2 + Indoor 30ft doublet
KD2MX	NJ	3500	10	< 5W	50	20	10	7	0	FT897 + 650ft loop
K4PBY	FL	2835	9	< 5W	45	20	9	7	0	Argonaut V + Inv Vee
WA1GWH	NY	2660	10	< 1W	38	40	7	10	0	SW40+ + 1/4 wave inverted L
KJ4AOM	KY	2352	9	< 5W	42	40	8	7	0	K2
NU7T	NV	2040		< 5W		20				
WA1WQG	CT	1260	6	< 5W	30	40	6	7	0	OHR 100A + OCF Dipole
VA3CBE	ON	800	4	< 1W	20	20	4	10	0	IC703 + Ground Mount Vertical
N9GGE	IL	189	3	< 5W	9	40	3	7	0	MFJ-9040 + Inv Vee

far down in the 40 Meter Band!—**K4UK**

I worked more than I thought I would.—**WA3GYW**

I bought a new rig w/o a CW filter, OOPS! New filter now on order.—**K0LWV**

RTTY and pactor really messed up 40. Be great to try a QSO party mid week.—**W8IM**

Another challenging and enjoyable contest from QRP ARCI. Very sporadic operating. Lots of fun but constantly battling QRN which appears to be emitted from a plethora of nearby electronic devices. I guess it's the bane of operating from a downtown QTH. Interesting propagation on Saturday included a decent 15m opening Sunday was useless with QRN running at S9 all day on 80m through 15m. Very pleased to see excellent scores reported from fellow CCO Beaver Boys. I am in awe of their contesting skills.—**VE3EUR**

Stayed on 20 for what operating I did over the weekend. Tried other bands except 40 but no QSOs. QRN was very intense both days here. At times more than the ears could stand. Thanks to the QRPARCI folks once again for continued support of the QRP contests.—**W5USJ**

Grid Square Sprint Top 5 Results

N4BP	67,725	Bob Patten
K0ZX	37,408	Arnold Olean
AA4XX	26,700	Paul Stroud
AA2YV	24,948	William Hopkins
K3HX	24,500	Tim Colbert

Fun Contest.—**WB0SMZ**

Could only operate about an hour but as always nice to hear and work old friends.—**W5TB**

Operated from AZ, extremely poor condx—**W0RSP**

The great QRP ARCI operators and conditions made my first QRP ARCI Contest very enjoyable. I normally have trouble making contacts when running < 1 watt but everyone that I called came back to me with good reports. Thanks to QRP ARCI and their great operators.—**N0EAX**

Wish I could find more time to operate.—**KD2MU**

Not much time for this one but I enjoyed the contacts I was able to fit in.—**KD2MX**

Lousy Condx—**NG2T**

Early Saturday morning I heard a station calling CQ ARCI and went to your website to find out what contest was running. It looked like fun and I sent out my CQ later that evening. The condx were 'orrible—some RTTY stations were QRMing both 7030 kHz and 7040 kHz and the static was deadening. I stuck it out for about 5 hours 'til some electrical monster wasted out the band. Fortunately, I met these nice folks. I hope to see you for your

Summer Homebrew Sprint in July.—**KI6OFN**

I got called away from the contest by my employer AND my family. I had a lot of fun with this even if it didn't last very long: At least next time "improvement" should be easy.—**KU8H**

Grid Square Sprint Soapbox—

Activity seemed fairly good, but conditions were poor. Paul, AA4XX gave me four grids from his mobile. Only DX was DL3DXX.—**N4BP**

I have not been living in my home QTH for six months and have the heat turned off. The temperatures inside are around 40 degrees Fahrenheit and I have to keep my keying hand warm by holding a lamp fixture at times. BBRRR. The rig is a new Elecraft K3. The K3 really knows hw to hear. I find many stations not coming back to me now. I am hearing much better that my 5 Watts is transmitting. If it's another K3, I make the contacts.—**K0ZK**

It was very tough sledding on 40M, so I switched over to 20, and found condx much better. It was a big thrill to work Martin, VA3SIE/pm! I had intentionally set up near the boundary of 4 grid squares in rural Duplin County, NC (FM04, FM05, FM14, and FM15), and N4BP ended up grabbing all four. Mobile operating sites included a small municipal airport, a church, a hog farm, and an unpaved side road. It only took five minutes to drive to adjacent grid squares, with a GPS letting me know when I was in the zone. This was my first QRP/m excursion, and it was a lot of fun. Thanks to all the awesome listeners out there.—**AA4XX/m**

2008 QRP-ARCI
Contest Schedule

July 13	Summer Homebrew Sprint
August 16	Silent Key Memorial Sprint
September 14	End of Summer Digital Sprint
October 18-19	Fall QSO Party
December 4	Top Band Sprint
December 21	Holiday Spirits Homebrew Sprint

Great Contest: a> Not too long for Sunday, b> you can see on the map w/grid squares what propagation you have.—**AA2YV**

Band quiet, confusion with another contest … HI!—**K3HX**

Better turnout than last year. Conditions seemed better too.—**AI2T**

Enjoyed the contest but could not come up with a log program.—**K9FO**

First time with the K3 in a contest.—**NE5DL**

I operated portable, from an island on the shore of Lake George, Florida, just across the street from my QTH. The support for the G5RV was a 65ft palm tree. What a life! Conditions weren't so great here. I kept waiting for some propagation and it didn't come. I never did hear the west coast. Although I did work all the stations I did hear.—**AA4W**

The contest was a lot of fun with a good amount of activity and was the first time I've used my KX1 in a year and a half—good to know it still works.—**AE5X**

Had a nice time. Action could have been better, but still a nice way to spend a few hours on Sunday. This was my first Grid Square Sprint.—**KD2JC**

I enjoyed the contest. Condx here were good.—**K0LWV**

Operated portable from local park using auto battery power and small multiband vertical lip mounted on the hood. First hour no action. A few stations heard but too "light" to be workable. Final hour very active.—**KC4ABC**

Heavy QRM on 40m from Spanish voice.—**AA2JZ**

Seemed like good conditions but not many players—maybe WX too good for indoor sports.—**W4RYW**

With church, had to do a rapid deployment in the snow for the last hour.—**VA3RKM**

40m pretty quiet after 1640UTC—worked no new stations.—**WA1GWH**

Great Fun … how do I join!—**KJ4AOM**

VA QSO party made our contest very hard to enjoy.—**N9GGE**

●●

N0AX's Notes on QRP Contesting (from his FDIM talk):

1. **It's fun!**
2. **You're louder than you think**
3. **Great for portable and mobile adventures**
4. **Quick way to earn awards**
5. **Excellent testing ground for builders**
6. **Learn about propagation**
7. **It's fun!**

Contest Announcements

For All Contests:

Entry forms and log submission procedures can be found at www.qrparci.org. Logs can be submitted by e-mail to contest@qrparci.org, or by postal mail to Jeff Hetherington, VA3JFF, QRP ARCI Contest Manager, (Contest Name), 139 Elizabeth St. W., Welland, Ontario, CANADA L3C 4M3. Submit Logs along with a summary stating your Callsign, Entry Category, Actual Power and Station Description along with score calculation.

Results:

Will be published in *QRP Quarterly* and shown on the QRP-ARCI Web site.

Certificates:

Will be awarded to the top scoring entrant in each category. Certificates may be awarded for 2nd and 3rd place if entries are sufficient in a category.

2008 Silent Key Memorial Sprint

Purpose:

Our contest celebrates and honors the QRP luminaries who no longer answer CQs. Those generous people who graciously donated to the QRP community their time, effort and knowledge to advance the premise that more fun could be had using less than 5 watts. Some were irascible and some were even considered curmudgeons, but when you took a keen look at their accomplishments and listened to those who knew them well you discovered truly wonderful people who would give you their last diode. The people we are celebrating are well known among the QRP Community. Some passed recently and some have enjoyed their reward many years. They are not forgotten for their accomplishments live on either on the bands, the internet, through published works or organizations that benefited from their largess. This contest celebrates ALL SKs who now call CQ from above, where all sigs are 599 and all contacts QSL 100%. Celebrate the many SKs that we have known and loved in years past.

Date/Time:

1500Z to 1800Z on 16 August 2008.

Mode:

CW Only

Exchange:

Members: RST, State/Province/Country, ARCI member #
Non-Members: RST, State/Province/Country, Power Out

QSO Points:

Member = 5 points/QSO
Non-Member, Different Continent = 4 points/QSO
Non-Member, Same Continent = 2 points/QSO

Multiplier:

SPC (State/Province/Country) total for all bands. The same station may be worked on multiple bands for QSO points and SPC credit.

Power Multiplier:

>5 watts = x1
>1 - 5 watts = x7
>250 mW - 1 watt = x10
>55 mW - 250 mW = x15
55 mW or less = x20

Suggested Frequencies:

160m	1810 kHz
80m	3560 kHz
40m	7030 kHz (please listen at 7040 kHz for rock bound participants)
20m	14060 kHz
15m	21060 kHz
10m	28060 kHz

Score:

Final Score = Points (total for all bands) x SPCs (total for all bands) x Power Multiplier + Bonus Points.

Bonus Points:

If you are operating PORTABLE using battery power AND a temporary antenna, add 5,000 points to your final score. (You can NOT be at your shack operating from battery power using your home station antenna to qualify for this bonus.) This is to help level the playing field for contesters who work from the field against contest stations with 5 element yagis at 70 ft.

Categories:

Entry may be All-Band, Single Band, High Bands (10m-15m-20m) or Low Bands (40m-80m-160m)

How to Participate:

Get on any of the HF bands except the WARC bands and hang out near the QRP frequencies. Work as many stations calling CQ QRP or CQ TEST as possible, or call CQ QRP or CQ TEST yourself! You can work a station for credit once on each band.

Submissions:

Entries must be postmarked on or before 16 September 2008.

2008 End Of Summer Digital Sprint

Date/Time:

2000Z to 2359Z on 14 September 2008.

Mode:

Any Digital Mode except CW. Stations may be worked once per band, regardless of mode.

Exchange:

Member = 5 points/QSO
Non-Member, Different Continent = 4 points/QSO
Non-Member, Same Continent = 2 points/QSO

Multiplier:

SPC (State/Province/Country) total for all bands. The same station may be worked on multiple bands for QSO points and SPC credit.

Power Multiplier:

>5 watts = x1

>1 - 5 watts = x7
>250 mW - 1 watt = x10
>55 mW - 250 mW = x15
55 mW or less = x20

Suggested Frequencies:

Check around the usual calling frequencies for the digital mode of your choice.

Score:

Final Score = Points (total for all bands) x SPCs (total for all bands) x Power Multiplier + Bonus Points.

Bonus Points:

If you are operating PORTABLE using battery power AND a temporary antenna, add 5,000 points to your final score. (You can NOT be at your shack operating from battery power using your home station antenna to qualify for this bonus.) This is to help level the playing field for contesters who work from the field against contest stations with 5 element yagis at 70 ft.

Categories:

Entry may be All-Band, Single Band, High Bands (10m-15m-20m) or Low Bands (40m-80m-160m)

How to Participate:

Get on any of the HF bands except the WARC bands and hang out near the QRP frequencies. Work as many stations calling CQ QRP or CQ TEST as possible, or call CQ QRP or CQ TEST yourself! You can work a station for credit once on each band.

Submissions:

Entries must be postmarked on or before 14 October 2008.

2008 QRP-ARCI Fall QSO Party

Date/Time:

1200Z on 18 October 2008 through 2400Z on 19 October 2008. You may work a maximum of 24 hours of the 36 hour period.

Mode:

HF CW only.

Exchange:

Members: RST, State/Province/Country, ARCI member #
Non-Members: RST, State/Province/Country, Power Out

QSO Points:

Member = 5 points/QSO
Non-Member, Different Continent = 4 points/QSO
Non-Member, Same Continent = 2 points/QSO

Multiplier:

SPC (State/Province/Country) total for all bands. The same station may be worked on multiple bands for QSO points and SPC credit.

Power Multiplier:

>5 Watts = x1
>1 - 5 Watts = x7
>250 mW - 1 Watt = x10
>55 mW - 250 mW = x15
55 mW or less = x20

Suggested Frequencies:

160m	1810 kHz
80m	3560 kHz
40m	7030 kHz (please listen at 7040 kHz for rock bound participants)
20m	14060 kHz
15m	21060 kHz
10m	28060 kHz

Score:

Final Score = Points (total for all bands) x SPCs (total for all bands) x Power Multiplier.

Teams:

You may enter as a team with an unlimited number of operators as long as no more than 5 transmitters are on the air concurrently. You compete individually as well as on the team. Teams need not be in the same location. Team captains must send a list of members to the Contest Manager before the contest.

Categories:

Entry may be All-Band, Single Band, High Bands (10m-15m-20m) or Low Bands (40m-80m)

How to Participate:

Get on any of the HF bands except the WARC bands and hang out near the QRP frequencies. Work as many stations calling CQ QRP or CQ TEST as possible, or call CQ QRP or CQ TEST yourself! You can work a station for credit once on each band.

Submissions:

Entries must be postmarked on or before 19 November 2008.

2008 QRP-ARCI Top Band Sprint

Date/Time:

0000Z to 0600Z on 4 December 2008.

Mode:

SSB, CW or mixed modes. Work stations once regardless of mode.

Exchange:

Members: RST, State/Province/Country, ARCI member #
Non-Members: RST, State/Province/Country, Power Out

QSO Points:

Member = 5 points/QSO
Non-Member, Different Continent = 4 points/QSO
Non-Member, Same Continent = 2 points/QSO

Multiplier:

SPC (State/Province/Country) total for all bands. The same station may be worked on multiple bands for QSO points and SPC credit.

Power Multiplier:

(Use the smaller multiplier if operating mixed mode)

For SSB QSOs:

>10 Watts = x1
>2 - 10 Watts = x7
>500mW - 2 Watts = x10
>100mW - 500mW = x15
100mW or less = x20

For CW QSOs:

>5 Watts = x1
>1 - 5 Watts = x7

>250 mW - 1 Watt = x10
>55 mW - 250 mW = x15
55mW or less = x20

Suggested Frequencies:

CW: around 1810 kHz
SSB: around 1910 kHz

*Please remember that 1830 to 1835 kHz should be used for intercontinental QSOs only

Score:

Final Score = Points (total for all bands) x SPCs (total for all bands) x Power Multiplier

Categories:

Entry may be SSB, CW or Mixed Mode.

How to Participate:

Get on top band and hang out near the QRP frequencies listed above. Work as many stations calling CQ QRP or CQ TEST as possible, or call CQ QRP or CQ TEST yourself! You can work a station for credit once on each band.

Submissions:

Entries must be postmarked on or before 4 January 2009.

2008 QRP-ARCI Fireside SSB Sprint

Date/Time:

2000Z to 2359Z on 3 February 2008

Mode:

HF SSB only.

Exchange:

Members: RST, State/Province/Country, ARCI member #
Non-Members: RST, State/Province/Country, Power Out

QSO Points:

Member = 5 points/QSO
Non-Member, Different Continent = 4 points/QSO
Non-Member, Same Continent = 2 points/QSO

Multiplier:

SPC (State/Province/Country) total for all bands. The same station may be worked on multiple bands for QSO points and SPC credit.

Power Multiplier:

>10 Watts = x1
>2 - 10 Watts = x7
>500mW - 2 Watts = x10
>100mW - 500mW = x15
100mW or less = x20

Suggested Frequencies:

80m	3985 kHz
40m	7285 kHz
20m	14285 kHz
15m	21385 kHz
10m	28385 kHz

Bonus Points:

If you are operating PORTABLE using battery power AND a temporary antenna, add 5000 points to your final score. (You can NOT be at your shack operating from battery power using your home station antenna to qualify for this bonus.) This is to help level the playing field for contesters who work from the field against contest stations with 5 element yagis at 70 ft.

Score:

Final Score = Points (total for all bands) x SPCs (total for all bands) x Power Multiplier + Bonus Points

Categories:

Entry may be All-Band, Single Band, High Bands (10m-15m-20m) or Low Bands (40m-80m)

How to Participate:

Get on any of the HF bands except the WARC bands and hang out near the QRP frequencies. Work as many stations calling CQ QRP or CQ TEST as possible, or call CQ QRP or CQ TEST yourself! You can work a station for credit once on each band.

Submissions:

Entries must be postmarked on or before 3 March 2008.

●●

Look for all contest results in *QRP Quarterly* and on the QRP ARCI Web site, www.qrparci.org

You can find entry forms and submission info as well

After the contest, post a message to the online forum to let the QRP world know how you did!

***Questions?* Ask Jeff, VA3JFF: contest@qrparci.org**

QRP ARCI CONTEST ENTRY FORM

QRP ARCI CONTEST NAME: ______________________ **MODE:** ________

CALLSIGN: ______________ **QTH:** ______________ **ARCI #:** ______________

MULTIBAND or SINGLE BAND (please circle one) **HIGHEST POWER USED:** ________

SUMMARY TABLE

BAND	QSOs	POINTS	S/P/C
160m			
80m			
40m			
20m			
15m			
10m			
TOTAL			

Enter Points and S/P/C Per Band

Please total each column in the Summary Table

Score Calculation Formula uses Totals

Mail this form along with your
log of contacts to:

Jeff Hetherington, VA3JFF
139 Elizabeth St. W.
Welland, Ontario
Canada L3C 4M3
or email to: contest@qrparci.org

TOTAL POINTS	X	TOTAL # S/P/C/	X	POWER MULTI	+	BONUS POINTS	=	FINAL SCORE
________	X	________	X	________	+	________	=	________

Total Operating Time: ______________

Transmitter / Transceiver ______________________________

Receiver ______________________________

Comments ______________________________

____

Name ______________________ **CALL:** ____________

Address ______________________________

City ______________________________

State/Province ______________________________

ZIP/Postal Code ______________________________

Country ______________________________

Email (In case of questions) ______________________________

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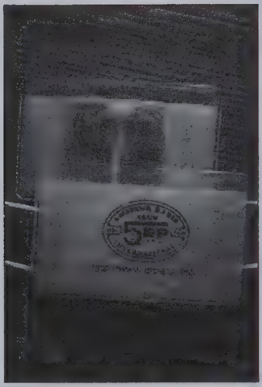

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08 11

QRP ARCI CONTEST LOG SHEET

ARCI CONTEST ______________________________ BAND _____ UR CALL ________

Time	Station	RST Out	RST In	His State	His#/Pwr	Workspace

AMATEUR RADIO CLUB
QRP
EST. 1961
K6JSS
A.R.C.I.
INTERNATIONAL

Created by WB5KHC

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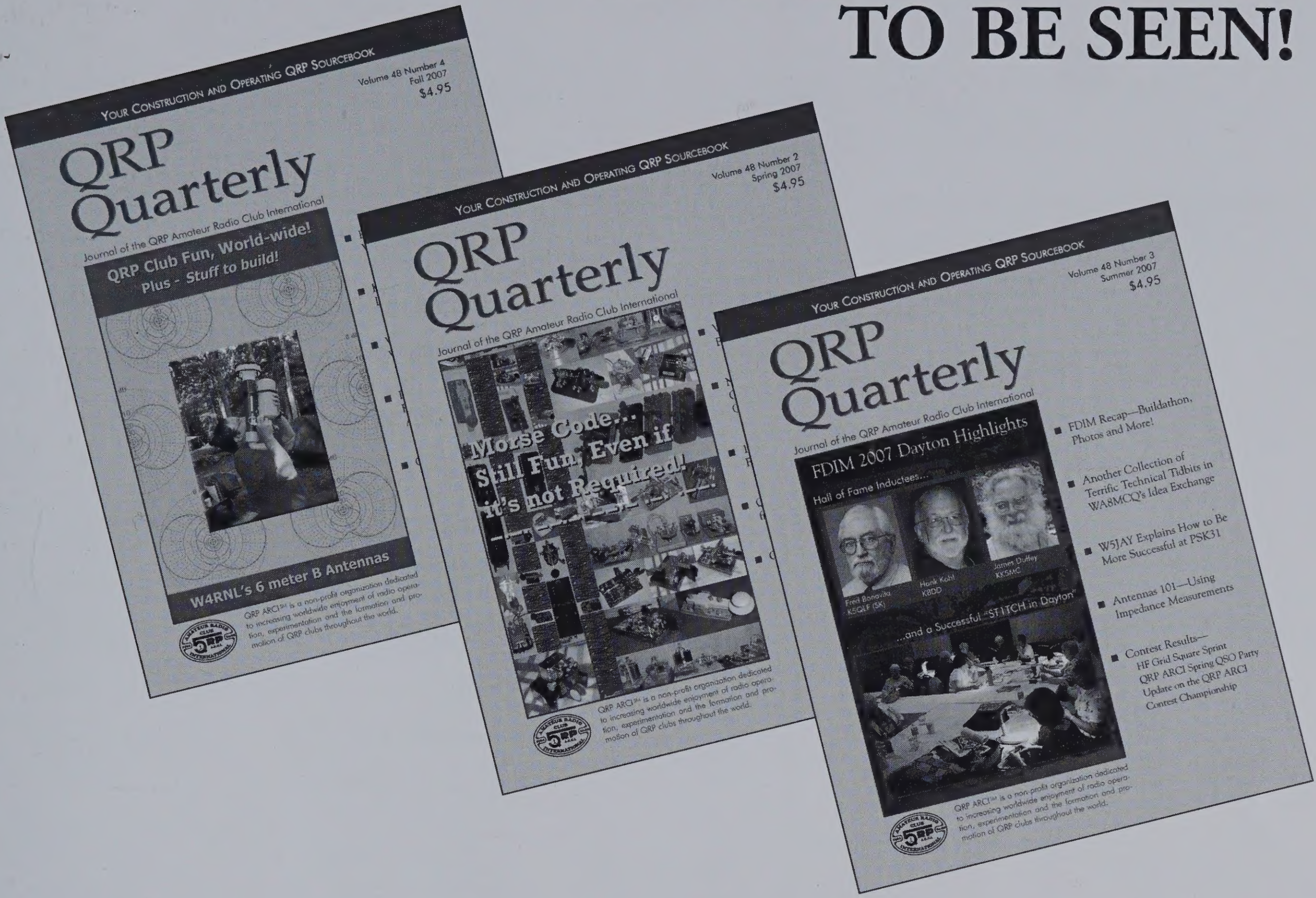
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Antennas 101—Using Impedance Measurements
Contest Results—
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QRP ARCI Spring QSO Party
Update on the QRP ARCI Contest Championship
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